



# Strategy Protection against Natural Hazards

## Security Level for Natural Hazards



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Swiss Confederation

Nationale Plattform Naturgefahren PLANAT  
Plate-forme nationale «Dangers naturels»  
Piattaforma nazionale «Pericoli naturali»  
National Platform for Natural Hazards

November 2014

**Compiled and published by**

National Platform for Natural Hazards PLANAT  
c/o Federal Office for the Environment FOEN  
CH-3003 Bern  
Phone: +41 58 464 17 81  
[planat@bafu.admin.ch](mailto:planat@bafu.admin.ch)      [www.planat.ch](http://www.planat.ch)

PLANAT 2011-2014:

Andreas Götz, Dörte Aller, Marco Baumann, Christoph Baumgartner, Gian Reto Bezzola, Bernard Biedermann, Willy Eyer, Laurent Filippini, Claudia Guggisberg, Christian Hofer, Thomas Huwyler, Valérie November, Olivia Romppainen-Martius, Bruno Spicher, Sarah Springman, Christoph Werner, Martin Widmer, Markus Zimmermann  
Wanda Wicki, Astrid Leutwiler (Secretariat)

**Editing**

Anne Eckhardt, risicare GmbH

**Collaboration**

Thomas Egli, Egli Engineering AG  
Armin Petrascheck, Wasserwirtschaftsberatung  
Hans Kienholz, KiNaRis

**Translation**

Susan Cox

**Proofreading and English editing**

Markus Zimmermann, Willy Eyer, Peter Gere

**Citation**

PLANAT 2014: Security Level for Natural Hazards. National Platform for Natural Hazards PLANAT, Bern. 15 p.

**Note**

The reproduction of extracts and graphics is welcomed provided the source is acknowledged and specimen copies are sent to the National Platform for Natural Hazards PLANAT.

## Contents

1. Preface	3
2. Glossary	4
3. PLANAT's Strategy „Protection against Natural Hazards“	6
3.1. Risk governance	6
3.2. Integrated risk management for natural hazards	7
4. Recommended Security Level: PLANAT's Suggestions	9
4.1. Protected objects	9
4.2. Recommended security level	10
4.3. Target audience of the PLANAT recommendation	11
5. Attaining the Recommended Security Level – A Joint Task	12
5.1. Cooperation between all responsible actors	12
5.2. Function of protection goals	12
5.3. Integrated planning of measures and protection goals	13
6. Outlook	15



## 1. Preface

In the aftermath of a series of devastating storms of the 1990's, the Swiss government found an urgent need to mitigate natural hazards. In order to curb damage caused by such events, to protect living environments sustainably and to improve prevention and mitigation, the Federal Council founded in 1997 the National Platform for Natural Hazards (PLANAT), as an extra-parliamentary commission of the Federal Department of the Environment, Transport, Energy and Communications (DETEC). PLANAT was later commissioned by the Federal Council to develop the "Protection against Natural Hazards" strategy (*Sicherheit vor Naturgefahren*<sup>1</sup>).

This strategy aims to maintain a comparable security level for all natural hazards throughout Switzerland through sustainable means that are environmentally friendly, economically viable and socially responsible. This first requires a clear definition of acceptable and unacceptable risks. Accordingly, the recommended security level describes the status that all actors aim to achieve. For specific projects, the protection goals describe the individual measures and their contribution to reaching the recommended level of security.

PLANAT explored the issue of the recommended security level. This process revealed that the concepts, "security level" and "protection goal," are interpreted in very different ways. However, a uniform definition is essential for a common understanding. PLANAT presents its first recommendation in the document at hand, *Security Level for Natural Hazards*. Each sector must develop its specific requirements according to these recommendations.

This recommendation is primarily aimed at the Federal Council and DETEC as its commissioning bodies, and those who are responsible for implementing the strategic guidelines on integrated risk management. It is planned to complement this recommendation with a detailed report.

*Note: The integrated management of risks (IRM) is a global task. Although this report has been developed with and for Swiss stakeholders, PLANAT is convinced that individual elements can be generalized and used to foster the necessary dialogue on risks in different contexts.*

---

<sup>1</sup> PLANAT (2004): Protection against Natural Hazards in Switzerland – Vision and Strategy. National Platform for Natural Hazards PLANAT.

## 2. Glossary

Hazards	Natural hazard	<p>All events in nature that can cause damage to human life, material assets and the environment.</p> <p>The following natural hazards are relevant for Switzerland:</p> <ul style="list-style-type: none"> <li>- Gravitational natural hazards:             <ul style="list-style-type: none"> <li>&gt; Water-related hazards (flood, debris flow, river bank erosion, surface runoff, water logging, sewer blockage and backflow)</li> <li>&gt; Landslides (permanent and spontaneous, slope-type debris flow)</li> <li>&gt; Rockfall processes (rockfall and rock avalanche, ice fall, sinkhole, subsidence)</li> <li>&gt; Avalanches (flow and powder avalanche, snow-slide)</li> </ul> </li> <li>- Tectonic natural hazards: earthquake</li> <li>- Climate and meteorological hazards: drought, forest fire, heat wave, cold wave, rain storm, hail, storm, snow and lightning.</li> </ul>
Objectives	Security level	Security status envisaged by all responsible actors.
	Protection goal	Level of security that particular responsible actors aim to achieve in their area of responsibility. In practice, the protection goal is also used as a criterion for assessing the need for action to reach the recommended security level.
	Objectives of action planning	Degree of security to be achieved with a certain measure. The overall effect of the implemented measures should meet the recommended security level.
Objects of protection	Protected objects	Assets and valuables for which risk shall be limited to an acceptable level.
Risk	Risk	Extent and probability of occurrence of damage. Characteristic parameters include the average annual damage and the extent to which damage may recur.
	Risk analysis	Process used to characterise and quantify a risk in relation to the probability of occurrence and extent of damage
	Risk evaluation	Process used to assess the information obtained from a risk analysis that is based on personal and collective criteria and its relation to the acceptability of the risk.

	Risk governance	Continuous and systematic identification, analysis and evaluation of risks, the planning and implementation of measures in response to the observed risks, based on the principles of cooperation, participation, mitigation and sustainability, and controlling the effectiveness of these measures.
	Integrated risk management	Risk management approach where all natural hazards and all types of measures are considered, all responsible actors participate in the planning and implementation of measures, and environmental, economic and social sustainability is envisaged.
	Risk dialogue	Communication activities between all involved actors, which aim to establish a culture of risk protection in accordance with the PLANAT strategy.
Actors	Risk carrier	Persons and institutions that use their human and financial resources to compensate for the loss that can arise from natural hazards. Direct risk carriers include building owners and users, landowners, insurance companies, public authorities, and the operators of infrastructure.
	Responsible actor	Persons and institutions whose duty it is to keep existing risks at an acceptable level and/or reduce them to an acceptable level.
Measures	Integrated action planning	Ascertainment and selection of the optimum combination of measures for reducing risks to an acceptable level or maintaining the attained security level. With integrated action planning, opportunities and risks are weighed while taking all dimensions of sustainability into account.

### **3. PLANAT's Strategy „Protection against Natural Hazards“**

In 2003, PLANAT formulated, "Protection against Natural Hazards" (Strategie Sicherheit vor Naturgefahren), a strategy which assessed existing risks in Switzerland, and evaluated responsibilities, resources and instruments to cope with those risks. The PLANAT strategy raises awareness of a risk-based philosophy and promotes integrated risk management in the area of natural hazards. It also reveals where action is required in the management of natural hazards.

The PLANAT strategy is in line with the 2012 strategy of the Department of the Environment, Transport, Energy and Communications (DETEC). Similar to the PLANAT strategy, DETEC's strategy is based on the concept of sustainable development. The Department's strategy states that protection shortcomings in the area of natural hazards and major technological risks must be largely eliminated by 2030. In addition, the development of settlements and use of infrastructure must be adjusted and adapted to the natural hazard conditions by this same time. The aim is to achieve an optimal balance between the security requirements and financial capability.

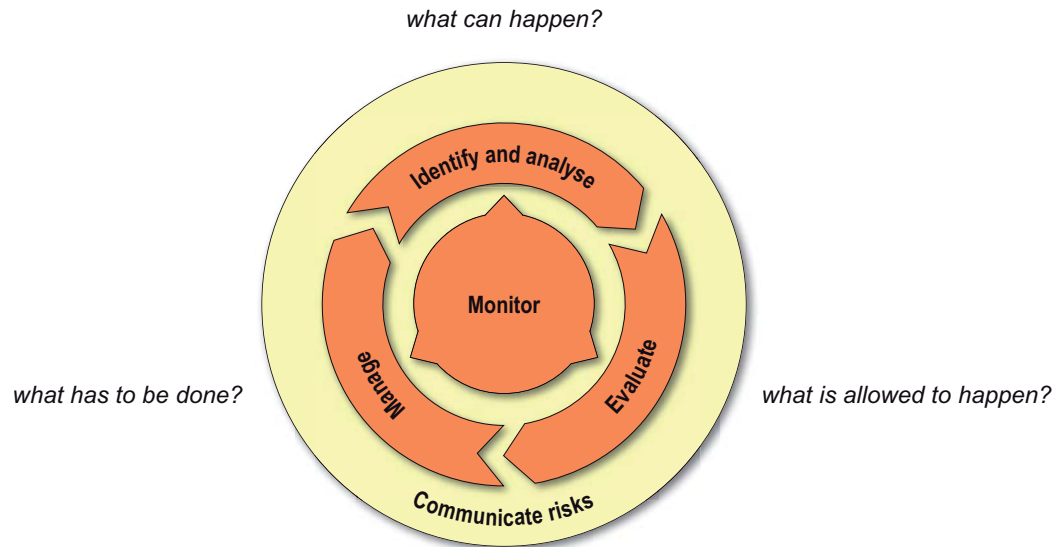
#### **3.1. Risk governance**

The tasks involved in risk governance consist of elements such as (see Figure 1):

- periodically identifying and analysing the prevailing risks;
- evaluating and weighing of risks in relation to their acceptability;
- implementing measures to manage the prevailing risks. Through suitable measures, new risks are avoided, unacceptable risks reduced and acceptable risks managed. A risk dialogue among all actors is a precondition for effective risk management.
- continuous monitoring of the relevant risk factors and the effectiveness of measures;
- communicating about risks and maintaining a risk dialogue with all stakeholders.



Figure 1: Risk governance is a forward-thinking process. It involves the continuous, systematic identification and assessment of risks, and the planning and implementation of measures in response to observed and possible future risks (risk management and risk control).



Risk governance provides answers to three key questions:

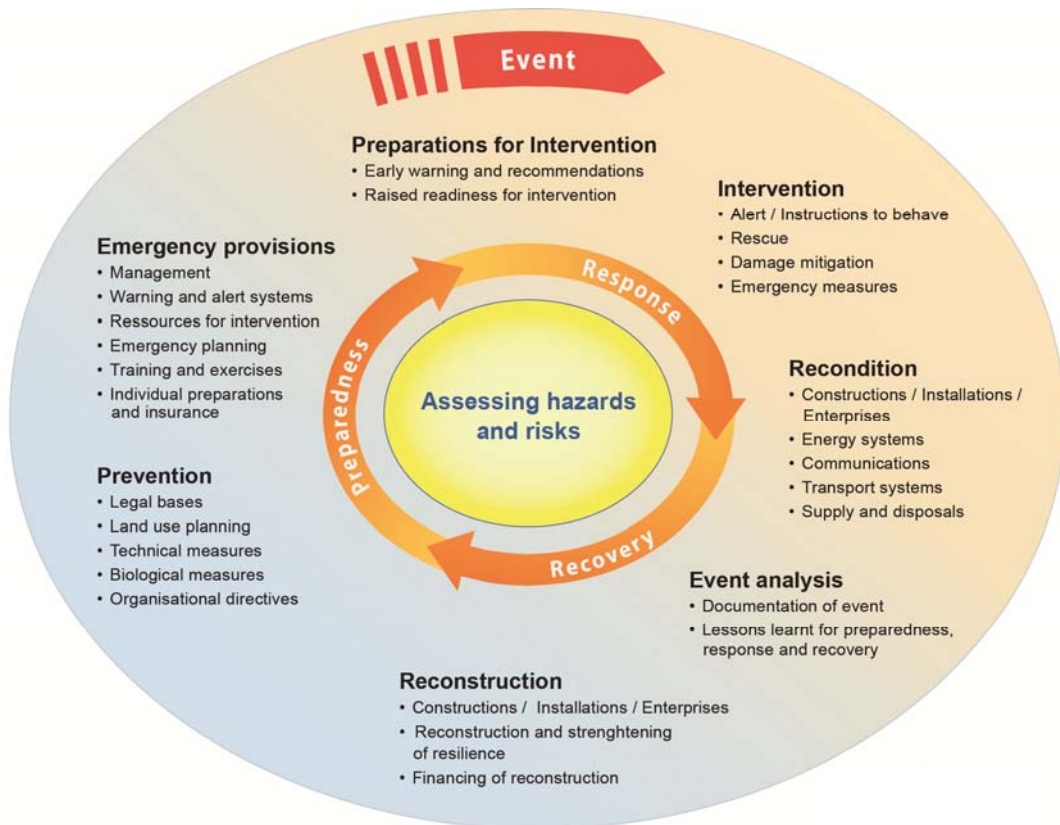
Question	Answer
What can happen?	Risk identification and analysis is a systematic, science-based process. Both the intensity and frequency of natural hazards and the expected consequences (damage, losses) are analysed.
What is allowed to happen?	The evaluation and weighing of risks is a social process to distinguish between acceptable and unacceptable risks. A risk that is considered permissible for good reason is an acceptable risk.
What has to be done?	Measures are implemented to avoid future risk, to reduce existing risks to an acceptable level and to manage the remaining risks with individual approaches.

### 3.2. Integrated risk management for natural hazards

According to the PLANAT strategy, Integrated risk management implies achieving a comparable security level for all natural hazards. Numerous actors bear responsibility for protecting against natural hazards, either because they are legally obligated or they assume individual responsibility. All responsible actors must be involved in the planning and implementation of measures. In this process it is relevant to consider not only one type of measure but also the full spectrum of possible measures.

Integrated risk management is informed by comprehensive data and information about the occurrence of hazards and the respective risks. The measures used to control risks are diverse, have to be combined in an optimal way and should cover the three phases of the risk management cycle: mitigation preparedness, response and recovery (see Figure 2).

Figure 2: Range of measures involved in integrated risk management and phases in which they are implemented (Source: Swiss Federal Office for Civil Protection).



## 4. Recommended Security Level: PLANAT's Suggestions

The legislation of Switzerland constitutes the most important basis for the formulation of the recommended security level for natural hazards. The federal legislation contains obligations and grounds for the protection of assets and valuables against – *inter alia* – natural hazards.

### 4.1. Protected objects

Assets or valuables, for which risk must be limited to an acceptable level, are referred to as *Protected objects*. Following Swiss law and the EU Flood Risk Management Directive,<sup>2</sup> the following three categories of protected objects are important: 1. Persons, 2. Major material assets, 3. Environment (see Figure 3).

>Top priority is given to the protection of *persons*.

>The *major assets* of both individuals and the society are protected:

>The protection of individual's assets focuses on buildings. Buildings and their contents are usually valuable material assets. In addition, buildings protect humans against natural hazards and are, therefore, essential for survival.








>The protection of public assets concentrates on the specific interests of society. The major public assets include: infrastructure, elements of major economic importance, basic resources for livelihood, and cultural goods. The loss of these public assets often constitutes serious secondary damage, amongst other wide-ranging consequences. Hence, the aim is to conserve these assets in the long run. Cultural goods are primarily protected for idealistic reasons.

>The *environment* is protected on its own account.

---

<sup>2</sup> EU (2007): Directive on the assessment and management of flood risks (2007/60/EG). European Commission, Brussels.

Figure 3: Protected objects in accordance with the PLANAT recommendation

Category	Protected object		Protection obligation	What is protected?
<b>Human beings</b>	Persons		Protection of human life and health	The individual
<b>Major material assets</b>	Buildings		Protection of property	
	Infrastructure		Protection of Swiss economy	The society
	Objects of considerable economic significance or scope		Protection of Swiss economy	
	Essential natural resources for livelihoods		Protection of natural resources	
	Cultural goods		Protection of the cultural heritage	
<b>Environment</b>	Nature, environment		Protection of nature	The environment

The recommended security level promoted by PLANAT relates to the direct effect of natural hazards on a protected object. It does not cover technical risks triggered by natural hazards; these are regulated by the Major Accidents Ordinance, where natural hazards are considered one of the possible triggers of such accidents.

#### 4.2. Recommended security level

PLANAT recommends that in the long run the following security level be envisaged for the protected objects:

##### Human beings

The average risk of death for human beings is not significantly increased by natural hazards. The annual risk of being killed as a result of natural hazards is significantly lower than the average probability of death for the age group with the lowest mortality rate in Switzerland.

##### Major material assets

- *Buildings*  
Buildings have to provide a high level of protection to persons and their movable goods. They have to be resistant and should not pose any threat to persons and other material assets. The residual risks to persons and material assets are acceptable to the risk carriers.

- *Infrastructure, objects of considerable economic importance or scope, essential natural resources*  
The risk to infrastructure, economically important assets and essential natural resources for livelihood is so low that the continued existence of the society is guaranteed today and for generations to come. Vital goods and services may only be disrupted simultaneously in large parts of Switzerland for short periods of time.
- *Cultural goods*  
Cultural goods are protected from natural hazards to ensure that their cultural value is conserved permanently.

### Environment

PLANAT does not formulate any security level for the environment. On the one hand, the object of protection, i.e. "major material assets", also incorporates the fundamental natural resources for livelihood (e.g. water, soil). On the other hand, the processes that unfold during natural events are part of the natural dynamics of habitats. Hence, natural hazards or events do not pose a problem for nature and may even be desirable.

Other assets exist for which PLANAT does not formulate a security level. This applies to livestock in particular. Livestock has a high priority in Swiss legislation and is treated differently than material assets. Its protection is the responsibility of the owner. PLANAT refrains from designating a security level for livestock, as other regulatory provisions already cover its protection needs (in particular protection of buildings and fundamental natural resources for livelihood).

### **4.3. Target audience of the PLANAT recommendation**

The security level proposed by PLANAT is a recommendation aimed at political decision-makers. In line with DETEC's departmental strategy, it is required that the security level be reached by the year 2030. Hence, the recommended security level is formulated as a long-term, effective goal and meets the challenges as comprehensively as possible.

The PLANAT recommendations are addressed to actors assuming *institutional responsibility*. According to this perspective, those affected by risk may assume that an institution will keep the risk within limits (e.g. public authorities or owners of large building).

Taking on the perspective of *individual responsibility*, those affected by a risk may not assume that an institution will keep the risk within limits on their behalf. Hence, they are responsible for ascertaining their degree of security and providing their own protection.

## **5. Attaining the Recommended Security Level – A Joint Task**

### **5.1. Cooperation between all responsible actors**

The recommended level of security must be attained through cooperation between all actors responsible for protection against natural hazards. These include a variety of actors, for example, building developers, building owners, the operators of infrastructure, insurance companies, public authorities and those directly affected by the risks.

The public authorities include the federal authorities, cantons and municipalities. In accordance with their legal mandate, the public authorities contribute to risk avoidance and risk reduction for the different natural hazards. They are extensively involved in the area of gravitational natural hazards, where they are responsible, in particular, for providing basic, area-wide structural protection and aiding private actors in assuming their responsibilities through warnings and alerts. In the case of seismic natural hazards, authorities' focus is on earthquake-resistant construction and raising awareness for individual responsibility. In the field of climate and meteorological hazards, the public authorities are mainly active in warning and providing information to those affected by the associated risks of such events. Spatial planning, such as zoning and building regulations, is a major instrument used to avoid new risks. Synergies and conflicts of interests with other public tasks must be taken into account.

From the perspective of institutional responsibility, those affected by risks do not bear the main responsibility for protection, however, it is still the task of individuals to contribute to reaching the recommended level of security (e.g. through local protection of their property and risk-conscious behaviour). Hence, individual responsibility is very important in the context of protection against natural hazards. The basic principle of individual responsibility is enshrined in Article 6 of the Swiss Federal Constitution.

### **5.2. Function of protection goals**

The "comparable level of security throughout Switzerland" referred to in the PLANAT strategy must be adopted as a joint objective by all actors. With protection goals, the responsible actors decide how much they are able to contribute to the security efforts. Hence, protection goals describe in quantitative terms the contribution each responsible actor will make in order to reach the recommended security level. To attain maximum effect, the protection goals of the individual actors must be coordinated with the other responsible actors.

Transparency and comprehensibility are important in the context of decisions about the public authorities' involvement in protection against natural hazards. Hence, a series of protection goals for the public authorities were formulated and published over the last

few decades.<sup>3</sup> In the area of floods, for example, the public authorities provide basic area-wide protection. With the help of the protection goals, the need for action is identified. Hence, in practice, protection goals also act as a monitoring criterion for assessing whether or not action is necessary in order to reach recommended security levels. Similar to the public authorities, other responsible actors, for example the operators of licensed transportation systems, set monitoring criteria for protection objectives. In many cases, for example in relation to the licenses, specific requirements must be observed.

The federalist structure of Switzerland, extensive autonomy of municipalities and cantons, and the conditions of direct democracy must be taken into consideration when setting the public authorities' protection goals. Planners and experts provide a sound technical base for the necessary political decision-making.

### **5.3. Integrated planning of measures and protection goals**

The responsible actors define the planned effects of structural and non-structural measures against natural hazards. These are based on the protection goals but can be subject to scrutiny in the context of the optimisation process. When accompanied by a transparent justification, downward or upward adjustments are possible. All related issues of sustainability play a central role (social, economic and environmental issues).

Through their standards, private-law organizations, such as the Swiss Society of Engineers and Architects (SIA), make a significant contribution to the definition of the requirements for structural measures included in a security concept. In addition, some of the SIA's standards contain protection goals that apply to developers and the specialists mandated by them.

Figure 4 exemplarily presents how mitigating the effects of natural hazards may develop. In the example's initial state, neither the recommended security level proposed by PLANAT nor the protection goals outlined by the responsible actors have been attained. The risk exceeds the acceptable level and there is need for action. All actors are then involved in the subsequent integrated action planning that considers all aspects of sustainability. Measures to avoid new unacceptable risks are planned and implemented as early as possible.

It is acceptable to strive for a higher level of security than the recommended level of security as long as the increased protection is considered sustainable. In these cases, the owner and insurance sector carry the residual accepted risk.

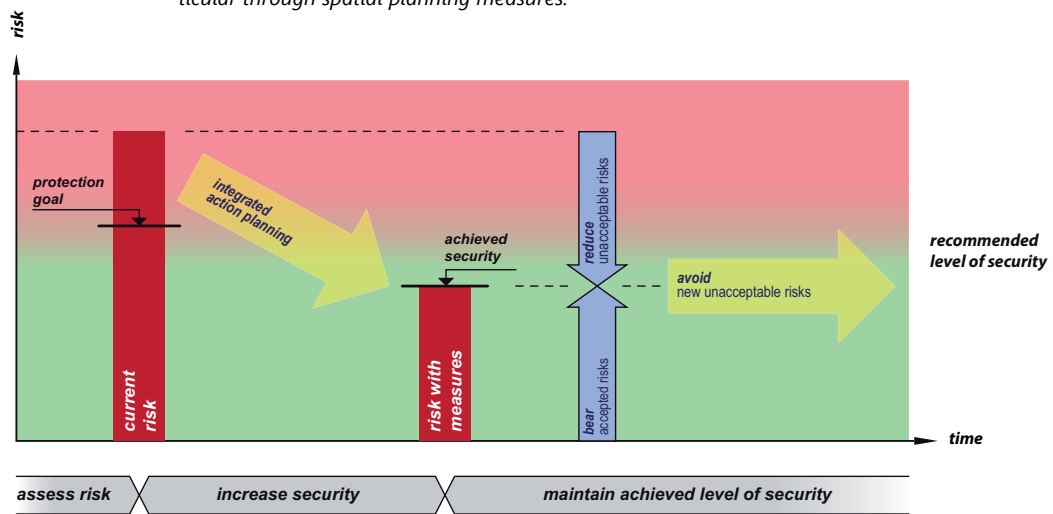
---

<sup>3</sup> For example in the publication by the former Federal Office for Water and Geology: BWG (2001): Flood control at rivers and streams – Guidelines of the FOWG. Federal Office for Water and Geology FOWG.

In well-founded cases, the level of security attained may also be lower than the recommended level of security: Higher residual risks are acceptable if the required risk reduction cannot be achieved by sustainable measures.

Figure 4: Procedure for achieving and maintaining the recommended level of security.

- Monitor and assess risks: protection goals enable the responsible actors to periodically monitor whether they need to take action.
- Increase security: to reduce the risk, measures are planned and implemented as part of an integrated process.
- Maintain achieved security level: all actors jointly maintain the achieved security level, in particular through spatial planning measures.





## 6. Outlook

The recommended security level and protection goals are social requirements. Their definitions can have considerable impacts, in particular economic ones. Today a total of CHF 2.9 billion is spent annually on natural hazard protection in Switzerland. The insurance sector, private companies and households provide CHF 1.7 billion of this amount. The federal authorities, cantons and municipalities provide the remaining CHF 1.2 billion.

The protection against natural hazards is a long-term and joint task; all responsible actors must jointly develop protection measures. The residual risk is borne in solidarity; however, all risk carriers must be made aware of their own roles and responsibilities.

The use of available space changes quickly. In light of this, the achievement of the objectives must be monitored regularly, taking into account societal changes and climate change. The risk-conscious approach to natural hazards, particularly in the context of land use, is both a duty and an opportunity for Switzerland.



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Swiss Confederation

**Nationale Plattform Naturgefahren PLANAT**  
**Plate-forme nationale «Dangers naturels»**  
**Piattaforma nazionale «Pericoli naturali»**  
**National Platform for Natural Hazards**

National Platform for Natural Hazards PLANAT  
Federal Office for the Environment FOEN  
CH-3003 Bern  
Phone: +41 58 464 17 81  
[planat@bafu.admin.ch](mailto:planat@bafu.admin.ch) [www.planat.ch](http://www.planat.ch)