



Bayerisches Staatsministerium für  
Umwelt und Gesundheit



# Work Package 6: Risk Prevention & Management

## Expert Hearing

### Torrential Risk Management and Environment

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Bavarian State Ministry of the Environment and Public Health

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## I. ABBREVIATED VERSION

The Alpine Space, a super sensitive living space, is affected by many natural disasters every year. Although risks seem to be similar in the different Alpine countries, the initial situation regarding methods differs in each nation while they agree in general strategies. Anyhow, the influence of climate change on frequency and magnitude of extreme events is taken as granted in the meantime. Scientific experts now challenge the strategies of risk management. In the frame of an Expert Hearing which took place on 5<sup>th</sup>/6<sup>th</sup> of November 2009, the focus of the discussion was on torrential hazards like floods, hyper-concentrated flows or debris flows.

Time for the development of strategies is short, since climate change is currently ongoing and proceeding fast. Therefore, it is of particular importance that scientists work closely together in order to use synergies as well as to exchange knowledge and experiences. Against this background the international brain trust agreed in a common policy and common objectives for an integral risk management at the end of the meeting.

Some general recommendations are summarized below. Please note that their sequence is of no significance.

- Increasing knowledge and experience exchange on national and international level with focus on practical realization of strategic approaches
- Enhancing the cooperation and coordination between responsible units and their tools on regional and national level
- Maintaining a certain degree of flexibility and freedom of decision concerning the tools' application taking different framework conditions in the Alpine space into account
- Enabling decision makers to identify the hot spots with prior need for action and to compare potential prevention measures from all relevant perspectives (economic, ecologic, and social) and on all levels (national, regional, and local)
- Maintaining of prevention constructions in the future
- Enhancing the political and public status of risk prevention by identifying the return on investment
- Improving early warning and emergency planning continuously
- Strengthening self assessment after an event and learning from mistakes but also highlighting good examples
- Increasing self responsibility of citizens by intensification of the risk dialogue
- Providing financial support for necessary protection measures and their maintenance
- Considering all aspects of the risk management circle for an intersectoral handling of water related natural hazards

Following this Expert Hearing, the Bavarian State Ministry of the Environment and Public Health is going to carry out two further events in 2010 in close collaboration with the Bavarian Environment Agency:

- Experience Exchange Workshop for Practitioners on 21<sup>st</sup> / 22<sup>nd</sup> of April 2010 in Immenstadt, Allgäu
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- Implementation of RiskPlan in a Bavarian municipality on the 9<sup>th</sup> of July 2010 in Immenstadt, Allgäu

These events will be based on the results of the Expert Hearing and aim at further examining risk management potentials and implementing first respective steps in the Bavarian Alpine Space. In this frame, it should also be tested whether these tools are suitable for achieving the expected results or if improvements are necessary.

## II. FULL VERSION

### 1 BACKGROUND INFORMATION

*AdaptAlp – Adaptation to Climate Change in the Alpine Space*

*The project is part of the Alpine Space Programme 2007-2013, which is jointly financed by the European Union, through the European Regional Development Fund (ERDF) and the Partner States (Members and Non-Members).*

Climate change is to a large extent constituted of increasing temperatures and changed precipitation patterns. Any change of these critical factors has implications on the frequency and extent of natural hazards. The uncertainties and the increase of natural hazards due to the impacts of climate change require concerted management in the Alpine Space.

AdaptAlp aims to improve information on the potential impact of climate change especially on regional level, to evaluate and harmonize different methods of risk assessment, hazard mapping and risk management in the Alpine environment, to identify best practice methods and transfer best practice experiences into adaptation measures in model regions and to reduce risk by raising awareness among local stakeholders. [www.adaptalp.org](http://www.adaptalp.org)

Central theme in one of four scientific Work Packages is a pragmatic, transnational approach to improve risk prevention and management. Based on good examples, case studies, workshops and expert hearings the transnational network will open an integrated risk dialogue to identify most effective methods.

Against this background, the Bavarian State Ministry of the Environment and Public Health (StMUG) invited to an experience exchange in the field of risk management of torrential hazards in due consideration of climate change.

In advance of this expert hearing two conferences have already taken place:

- Transnational expert hearing on natural hazards in Bolzano, May 2007
- Transnational expert hearing on design events in Vienna, April 2009

#### 1.1 EXPERT HEARING ON NATURAL HAZARDS IN BOLZANO, MAY 2007

*Dr. Gernot Koboltschnig, Hydrologist at the subdivision Flood Protection at the Dept. of Water Management of the Regional Government of Carinthia / Austria and Business Manager of the International Research Society INTERPRAEVENT*

The experts in Bolzano agreed upon the fact: The Integral Risk Management has generally been accepted but it still needs to be constantly developed further on and realized thoroughly, irrespective of the possible climate change. It is only possible to minimize future natural disasters damages by taking integral and sustainable measures. No doubt, climate change has already taken place and there could be several impacts on natural hazards. It is another uncertainty for existing and in future realized protective measures. As there are several other uncertainties in the estimation of design values it is hard to detect the impact climate change will have. Direct

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effects of climate change can hardly be influenced. However, it is possible to adapt to modified processes by applying the Integral Risk Management.

Climate change is an international problem. The experts agreed that international networks have to be used to exchange the knowledge. It is not necessary to start from scratch but to adopt and adapt already existing and established "Best Practices". The early warning systems need to be developed on regional, national and international level and the period within forecasts are being established need to be prolonged. Furthermore the individual responsibility has to be supported. Especially in case of property protection measures it is necessary to take over this duty. Public relations and education are important in order to give the necessary information to the building owners, the architects and planners. It is therefore also necessary to reconsider the regional planning with regard to the Integral Risk Management. Property protection measures have to be enacted for residents living in areas with an existing residual risk. At the planning of measures, the effects of climate change needs to be considered with appropriate scenarios. At the same time, the worst case has to be kept in mind, in order to determine the required space for extreme disasters. On the one hand, the maintenance of already existing protective measures shall be reconsidered, as it does not make sense to simply build new and bigger protective constructions, as climate change brings along further uncertainties. The present level of protection must be kept at that standard by an intensive maintenance. As climate change has already taken place in the past, an analytical view into the past can help, to improve the range of appropriate measures on the basis of a documentation of historical events. Climate change shall not lead to a sudden change of existing strategies. It should, however, represent the possibility to improve the practice in Risk Management and communication concerning residual risk. Climate change causes even more uncertainties in an inherently uncertain system. It is therefore necessary that all persons and parties concerned remain flexible and observe the development. We constantly need to be prepared for the unexpected.

*The complete short reports of the Expert Hearing on Natural Hazards in Bolzano in May 2007 can be found at: [www.interpraevent.at](http://www.interpraevent.at) -> Service -> Topics -> Climate Change in English and German.*

## **1.2 EXPERT HEARING ON DESIGN EVENTS IN VIENNA, APRIL 2009**

*Jane Korck, Hydrologist Bavarian Environment Agency, Unit "Climate Change, Impacts from Climate Change and Water Balance"*

*Barbara Mayer, Project Assistant Torrent and Avalanche Control in Austria, Forest Engineering Service*

The way climate change may be affecting extreme events is expected to have a major influence on protection measures, but the extent of this influence is simply not known. A reduced level of safety concerning water-related natural hazards could have dramatic social and economic consequences in the Alpine Space, making the adaptation of prevention strategies unavoidable. Against this backdrop, the nine AdaptAlp project partners in the Work Package "Water Regime" (WP4) are working together on

- the detection of changes in observed and projected hydrological variables,
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- the analysis of possible impacts on natural processes e.g. soil erosion, and
- the assessment of resulting hydrological hazards e.g. floods and droughts

for model regions in different river basins in the Alpine Space.

By bringing together scientists and practitioners in different related fields dealing with natural hazards management and climate change in the Alpine Space, the Expert Hearing on Design Events and Climate Change has already fulfilled one of the aims of AdaptAlp WP4. It was commissioned by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management took place on April the 24th 2009 at the University of Natural Resources and Applied Life Sciences in Vienna.

The meeting set the scene for many of the activities of the “Water Regime” group in AdaptAlp: Some partners are focussing more on quantifying past and possible future effects of climate change on the water regime of alpine river basins, whilst others are aiming to reduce uncertainties in the models that describe present conditions. The discussions, plenary and in break out groups, showed that both approaches are important: In the words of one participant “Whatever we discuss, we always come back to the need for an integrated approach!”

The results of the hearing are summarised in the following Key Messages:

1. Practitioners are calling for new “state-of-the-art” methods for the derivation of design events but science is cautious of this term
2. There is a discrepancy between the demands of society, politics and administration for prognoses about the future and the kind of results science is able to produce
3. Uncertainties are still very high in all steps of the model chain and must be quantified to avoid misconceptions. In the long term uncertainties should be reduced as much as possible
4. We need best practice examples for the reduction of uncertainties and the inclusion of climate change impacts in the model chain
5. Both the scale at which the process is modelled and the order of magnitude of the modelled event have a significant impact on the reliability of the results
6. Identifying the dominating processes within the catchments can significantly improve model results
7. An integrated approach to the derivation of design events, based on a wide range of observed data and taking all relevant processes into account, is the way forward
8. A lack of observational data is a major cause of uncertainties. We need more meteorological stations and gauges and we have to make use of “silent witnesses”
9. Finding common vocabulary for practitioners and scientists regarding design events, climate change, and uncertainties is an ongoing task
10. The residual risk is as difficult to calculate as the design event. The resulting uncertainties must be communicated clearly without creating “horror scenarios”

*An extended report about the expert hearing is available on the AdaptAlp website.*

[http://www.adaptalp.org/index.php?option=com\\_docman&task=cat\\_view&Itemid=79&gid=69&orderby=dmdate\\_published&ascdesc=DESC](http://www.adaptalp.org/index.php?option=com_docman&task=cat_view&Itemid=79&gid=69&orderby=dmdate_published&ascdesc=DESC)

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## 2 INTRODUCTION: ANTON LOIPERSBERGER

*Anton Loipersberger is head of section 61 – Flood Protection and Alpine Natural Disasters in the Bavarian Environment Agency*

Basing on the results of the two previous conferences, the current expert hearing concentrates on the instruments of an integral risk management with focus on the elements of prevention, preparation and reconstruction. For making the task manageable the issues of intervention and recondition were not considered. The subject of climate change as well as the possible consequence of increasing natural disasters was taken as granted.



Fig. 1: Risk management circle

With regard to the great variety of alpine natural disasters, the panel of experts concentrated on water-related torrential events such as floods, hyper concentrated flow or debris flow.

Questions of main interest were:

- How could a general strategy look like, in due consideration of different levels (e.g. national, regional or local)?

- Which activities are affected by climate change actually?
- Which measures are planned in the future beyond the traditional design of technical protection?
- Which experiences have been made with new methods in the past?
- Are there any new suggestions for further methods and what is still missing in this issue?
- How can society and policy makers get convinced of the integral risk management approach, especially in spatial planning and measurements concerning residual risk?
- Which is the best way to communicate the risks?

### 3 STATEMENTS OF THE ADAPTALP PROJECT PARTNERS

In order to reflect the relevant strategies and tools prepared or already used in the different alpine regions, several representatives introduced national statements.

#### 3.1 ITALY: REGIONE AUTONOMA VALLE D'AOSTA

*Dr. V. Segor, Director of Direction of Hydro-Geological Structure of Mountain Catchment Basins*

*Eng. P. Ropele, Chief of Service for Hydraulic Works*

*Geol. S. Ratto, Chief of Regional Operational Center*

*Geol. E. Navillod, Regional Operational Center*

*Eng. N. Bétemps, Service for Hydraulic Works*

*Eng. I. Voyat, Safe Mountain Foundation*

*Eng. M. Curtaz, Safe Mountain Foundation*

The reference experience in Aosta Valley is the flood of autumn 2000; in fact since this event the general strategy in risk management has been improved and protection measures to face to torrential risk like debris flows in the alluvial fans began to be constructed.

The general strategy can be summarized in different steps:

- basic knowledge of the territory made by each municipality to produce hazard cartography
- detailed studies for some areas, for example at the catchment basin scale, to define priorities in the protection measures and to design the civil protection plans
- residual risk management with the definition of civil protection plans; in these last a great aid is given by the early warning systems, which are able to reduce the gap between the demand and the answer of the aids, shortening the time between the moment when the crisis happens and the moment when the aids are available

Even if some laws already existed, only after 2000 the municipalities started to realize hazard maps and to make civil protection plans.

In this system some particularities have to be pointed out:

- In the cartography, the green area (low danger) is taken as the area of the maximum expansion of the events already happened and is always maintained, even after the construction of protection measures which instead can reduce the yellow and the red
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areas (medium and high risk). The intention is to keep the memory of the past events and to take possible deteriorations or lacking in maintenance into account. Obviously this policy is not always well accepted by the population living in this area and it has some economic and social consequences.

- The flexibility of provisional injunction which help in the restoration phase: on the one hand this procedure can speed the construction of protection measures but on the other hand these lack of detailed studies and therefore are often built overloaded or even underestimated (i.e. the 2000 flood could not be the maximum event).
- The territory of Aosta Valley is almost entirely exposed to natural hazards: some protection measures cannot be adopted because the space is small and the relocation of inhabited places is difficult to be applied.

The aspect of climate change has not been explicitly considered yet, but some procedures in the risk cycle, especially in the spatial planning and in the design of new protection measures, are indirectly taken in account.

For the moment we are not able to take it directly into account because

- the data for the event analysis are often not available as wished and we verified the lack of specific historical series with the necessary degree of confidence
- the uncertainty in the analysis methods is high also for the present situation
- We do not know how to quantify the contribution of climatic changes to forecast the future evolutions of the phenomena. The actual data are uncertain and maybe the influence of climate change is even smaller than this unreliability. For torrential risks we can expect an increase in sudden, more frequent storm events for which we can assume an increase of the design discharge and an overload in the measures, but we cannot exclude also a change in the phenomenology, in the type of phenomena which can produce.

Indirectly the climate change is considered updating constantly the tools, data and techniques for the risk management; in this dynamic system we can give some examples:

- The new regionalization of the hydrological parameters to calculate the design discharge. In Aosta Valley the regionalization was recently done including the last 20 years of data of rain series, so including also the changing trend possibly due to climate change.
- Studies of basin catchment debris potential. We started to consider the recent deglaciated areas as well as permafrost degradation areas as new zones of debris production: the glaciers retreat and the permafrost degradation can lead to an increase in the debris which can be carried by the water to the valley floor.

The suggestion is therefore to keep techniques, methods and data constantly updated and in line with the science progress.

What we miss is a social agreement and a policy of the residual risk with the intervention of the insurance companies. In Italy the self-responsibility does not exist at all and it is not considered by the laws: the magistracy (the judiciary system) tries to find a guilty in any case. Even if a citizen assumed a risk under his own responsibility since he did not follow the prescriptions of

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the cartography and chose to pay a special insurance to cover the eventual damages, the technicians could anyway be judged guilty in case of casualties or victims.

The risk prevention does not pay from the policy point of view: the prevention and protection measures which need great expenses appear unjustified. That's why we should awaken the citizen to the natural risks, and the best way to do it is to start from the children. Youth campaigns in schools and initiatives to preserve the risk memory in order not to forget the past events and to feel the problem of natural hazards always actual can construct a risk culture. A good example in Aosta Valley is a booklet made by the regional civil protection called "We are the civil protection" distributed to the citizens. It has been taken by the national civil protection later, but the more successful product of this campaign was a special game offered to the children.

The general economical crisis can become an incentive to the study phase of the phenomena and can therefore indirectly promote the updating of the tools to the technology and science progress. The need to make reasonable expenses and to define priority in the measures to be applied makes the politicians more disposed to support the study phase.

### **3.2 AUSTRIA: FED. MINISTRY OF AGRICULTURE, FORESTRY, ENVIRONMENT AND WATER MANAGEMENT**

*Barbara Mayer, Project assistant in AdaptAlp representing the Austrian Service for Torrent and Avalanche Control*

*Florian Rudolf-Miklau, Expert on Alpine Natural Hazards in the Federal Ministry for Agriculture, Forestry, Environment and Water Management*

#### CLIMATE CHANGE – CHANGING ENVIRONMENT

Impacts of global warming are already apparent in the Alps: decrease of 20% of the mean summer precipitation, regional changes between -10% and +20% for winter precipitation. Frequent extreme (storms, heavy rainfall) increasingly causing debris flows and floods associated with considerable ecological, economical and social damage.

#### ALPINE LIVING SPACE AT RISK

Large parts of Austria within the Alpine arc and related climatic conditions are at considerable risk of being affected by natural disasters. Extreme natural disasters in the near past:

- Avalanche disaster 1999 (Tyrol, Vorarlberg)
- Flood disaster 2002 (Salzburg, Upper Austria, Lower Austria)
- Flood and landslide disaster 2005 (Styria, Tyrol, Vorarlberg)
- Extreme snowfall event 2006 (Salzburg, Styria)
- Strom disasters 2007/2008: Kyril, Emma and Paula
- Flood disasters summer 2009 (Styria, Lower Austria, Upper Austria, Tyrol, Salzburg)

#### NATURAL HAZARD – CHANGING RISKS

Recent research results indicate that climate change has a paramount impact on natural hazards in the Alpine environment. The following changes are expected:

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- Probable increase of floods in frequency and amplitude
- Increase of avalanches in frequency and run out distances
- Extreme low water periods and droughts mainly in the summer
- Lowering of the water table; reduction of reservoirs of storage dams
- Risk of rock falls and slides caused by melting permafrost and melting glaciers
- Intensified risk of forest fires

#### NATURAL DISASTERS – SOCIOECONOMIC DAMAGE

- Floods in August 2002: claimed nine lives, had very detrimental effects on settlements and caused damages of approximately 3 billion Euros
- Floods and Landslides 2005: Austria's west experienced extreme rainfalls up to 250 mm a day, which led to disastrous floods again, causing damages of about 700 million Euros
- Storm events Paula and Emma 2008: Destruction of vast areas of forest in Styria, total damage of 4,15 Mio. cubic meter of wood

#### ADAPTATION STRATEGIES – NEW APPROACHES

Natural hazards are phenomena in nature that cannot be prevented, only mitigated. Climate changes triggers changes that force to adapt human life to these changing risks. In the framework of Flood Risk I und II new strategies and approaches to adaptation were developed:

- Precaution in area = provision of necessary areas for flood retention and land use adapted to hazard potential
- Precaution in building = area development adapted to hazard potential, technical protection of buildings
- Precaution in behavior = public information, development of consciousness and acceptance for natural hazards, education

#### ADAPTATION STRATEGIES – RECOMMENDATIONS

- Transnational cooperation in the Alpine Space should be further intensified to exchange experiences, knowledge and methods between administration, technical authorities and scientists
- Monitoring of slope deformations and other natural hazards should be intensified to identify zones at risks as soon as possible
- Historic data as a retro-perspective analysis tool should be included for all kind of monitoring and scenario building
- A full coverage of hazard maps should be provided for areal development
- A "risk dialogue" has to be initiated between experts, administration and the public

<http://www.umweltbundesamt.at/umweltschutz/klima/projekte/floodrisk1/>

<http://www.umweltbundesamt.at/en/umweltschutz/klima/projekte/floodrisk2/>

<http://www.klimawandelanpassung.at/>

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### 3.3 BAVARIA: BAVARIAN ENVIRONMENT AGENCY

*Anton Loipersberger, Bavarian Environment Agency, Unit 61 – Flood Protection and Alpine Natural Disasters*

The issue of natural hazards and climate change is discussed now for quite some years. The crucial point is that on the one hand we need to design protective measures today which should provide the required level of protection for a long period of time. On the other hand we will have to expect an increase of natural disasters both in terms of magnitude and frequency but nobody can tell us the extent of these changes to be expected. The challenge is to prepare for a future development which we don't really know. It's the handling of uncertainties.

The strategy in Bavaria is closely related to the well known risk management circle. According to the issues of this hearing this statement will be limited to the topics of reconstruction as well as prevention and preparation. Beginning with reconstruction I will present some ideas of the Bavarian strategy:

As a basic principle it must be kept in mind that in Bavaria – different from all other regions in the Alps - the State of Bavaria is responsible for flood protection except small streams.

- Since 2004 a surcharge of 15% has to be made on the calculated 100 year flood for a new design of flood control works.
- As a general rule the designed control works have to be considered for the case of overloading. Is there an overloading capacity or will the systems fail suddenly? What will happen in this case, where are the endangered areas and what are the consequences? Also a predefinition of those areas, which should be flooded first in case of extreme events, could help to minimize the damage.
- Which technical measures are applicable in order to make construction works more resistant in case of overloading? For example: A central sheet pile wall in a dike prevents the total failure of the dikes in case of overflowing due to erosion. Of course, this is costly but may be adequate in some cases.
- We have elaborated quite some basic data for the alpine area describing the situation of vegetation, geology, geomorphology and topography. This data base enables us to detect those areas which are especially prone to disastrous events.
- A proper maintenance is also very important to maintain the level of protection on a long term. In the meantime we have an inventory of all construction works in the torrents describing their state and importance and the need for maintenance.
- At the moment we are going to intensify the well known ideas of an integral planning procedure in torrential catchments. We expect that this approach will be sustainable and also compensate changes because of climate change very well.

The management of the issues of preparation and prevention is a difficult task as therefore the cooperation of the public and the communities is needed. Of course we have quite a lot of publications like brochures, folders, posters or even videos all available in the internet. But the awareness of the public of possible risks is simply not present. This is true especially also for flash floods which could hit very many people. At least for an adapted land use we have now rather strict laws in Bavaria which prohibit a not adequate land use in flood plains such as housing

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areas. But this is sometimes simply not accepted by the local people especially in those places where there hasn't occurred a significant flood within the last few years. Even more it's still a problem to transfer the ideas of residual risk, prevention and preparedness to the people. We will apply the method of risk plan developed by the Swiss colleagues within our work in Work Package 6 hoping that this might be a helpful tool. There is also a guideline "Audit Flood – how well are we prepared" in preparation elaborated by the DWA which is the German Association for Water management, Waste Water and Waste. This guideline gives advice to assess the degree of preparedness in the communities. If we succeed to sensitise the communities for this matter this might be a very helpful tool in the future.

Summing up we think, that in the field of the technical measures we are on a good way to manage the challenges of climate change regarding torrential hazards. But the field of risk communication still is and could remain a difficult task in the future.

### **3.4 FRANCE: CEMAGREF**

*Didier Richard, Head of "Snow Avalanches Engineering and Torrent Control" Research Unit Cemagref*

#### RISK MANAGEMENT OF TORRENTIAL HAZARDS IN FRANCE

Procedures and decisions of urban planning must integrate natural hazards. The plan for prevention of natural hazards (plan de prévention des risques naturels prévisibles - PPR) established by the law of February 2, 1995 is now one of the main instruments of the French State's action in preventing natural hazards. The elaboration of the PPR is conducted under the authority of the prefect of the department, which approves it after formal consultation of municipalities and a public inquiry. The PPR is achieved by involving local and regional concerned authorities from the beginning of its preparation. It can handle only one type of hazard or more and cover one or several municipalities.

For territories exposed to greater hazard, PPR is a document which publicizes hazard exposed zones to populations and developers. It regulates land use taking into account natural hazards identified in this zone. This regulation goes from the possibility of building under certain conditions up to the building prohibition in cases where the foreseeable intensity of hazard or the non aggravation of existing risks justifies it. The PPR is servitude for urban planning and prevails to everybody: individuals, companies, communities and the State, especially when delivering building permits. It must therefore be annexed to the local urban plan when it exists.

In complement to the PPR, other procedures and tools are dedicated to the preventive information that must be given to the exposed inhabitants (information tools: DDRM, DCS, DICRIM, IAL...) and measures relating to the safety of persons and organization of rescue that must be taken into account by public communities and individuals (safety measures plan: PCS). These procedures are mandatory for the municipalities where a PPR exists. Danger studies are in addition mandatory for certain classes of hydraulic works (new reglementation for dams and dikes).

In the context of climatic changes, and considering the huge uncertainties related to torrential hazards, these procedures and tools should be able to take changes into consideration

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(adaptable...). For instance the tools for compulsory communication / information, which seem to be quite well developed in France, should be able to take into account evolutions towards more extreme scenarios. The priorities are now to do that the existing procedures work as it should and to reinforce their articulation, and to encourage individual responsibility, so that individual protective actions can be taken ("individual resilience"). Remaining questions concern the periglacial influences (permafrost melting), detection methods to identify the most sensitive catchments, phenomena monitoring and survey of their evolutions, the evolution of reference scenarios ("design event"), and the translation of the EU directive on the assessment and management of flood risks (considering extreme event scenarios).

French risk prevention web portal: [www.prim.net](http://www.prim.net)

Risk mapping: <http://cartorisque.prim.net/>

French Ministry in charge of risk prevention policy: <http://www.developpement-durable.gouv.fr/>

### 3.5 SLOVENIA: GEOLOGICAL SURVEY OF SLOVENIA

*Assist. Prof. Dr. Marko Komac, Geologist, Director Geological Survey of Slovenia*

*Prof. Dr. Matjaž Mikoš, Civil Engineer, Dean Faculty of Civil and Geodetic Engineering, University of Ljubljana*

The Alpine space in Slovenia is often at risk by different natural disasters. In the last ten years several extreme events occurred in the Slovenian Alps:

- Floods and landslides in October 1998:  
Several torrential floods, landslides and rock falls, especially on local roads occurred. Flooded roads and cellars. Energy production in the HPP Solkan and HPP Doblar was stopped.
  - Stronger summer storms in 1999:  
Flooded basements. A landslide on the road Kobarid-Robi. Stones and broken trees caused some difficulties in the traffic on local roads. In the Vrata valley the road was blocked by stones, rocks and sand. On the road to Jezersko the torrent brought more than a half a meter of mud. Due to stones and sand on the road the traffic on the road to Ljubelj pass was obstruct.
  - Landslide/debris-flow Stovže (Log pod Mangartom) in November 2000
    - 7 casualties
    - damage costs (buildings, infrastructure, telecommunications, agriculture and economy): 15,6 mio €
    - estimated remediation costs (not finished yet): 18 mio €
  - Floods and landslides in January 2001:  
Locally over 100 mm rainfall. Rivers have risen due to snow melt. Some landslides occurred. Due to avalanches road to the Vršičpass had to be closed down.
  - Floods and landslides in March 2001:  
Heavy rain and snow melting due to high temperatures.
  - Strug landslide in Kosečin December 2001:
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- 90 people under threat
- remediation costs, evaluated from 2005 – 2007: 3.3 mio €
- Summer storms in August 2003:  
Flooded basements. Several landslides and torrents on local roads occurred. Gozd Martuljek, Rateče – 150 mm rainfall. Kranjska Gora region was virtually cut off from the other parts of the country.
- Floods and landslides in September 2007:
  - up to 300 mm rainfall
  - 6 casualties
  - estimated damage: 200 mio €
- Summer storms in 2008:
  - at least five severe thunderstorms occurred
  - immense damage to property and agriculture (no exact estimations available)

In Slovenia recovery and intervention approach still dominates in the area of legal and cultural approach in tackling the natural disasters. Civil protection, which deals with the relief and intervention, is one of the most advanced in Europe, but not enough mitigation and prevention measures and policies are realized in practice. There's also no systematic approach to integrated risk management. Due to recent natural disaster events in Slovenia (a short overview of them given beforehand) some small but positive progress in general public's perception of the importance of prevention and mitigation measures have been made.

In October 2009, a new Governmental Office for Climate Changes was established to work on climate changes (15 people); the step was taken rather skeptically by professionals and NGOs. The general strategy is to adapt to climate changes, but nobody knows precisely what does that mean.

The traditional design of technical protection measures against flooding is still prevailing, to be planned and executed through complicated physical planning procedures. The way how it is put through is by large dominated by the state and to a minor extent by local communities. The need for the regionalization of Slovenia into three or more regions will additionally complicate the situation.

The idea of residual risk is slowly coming to the agenda, in some views to be covered by insurance. A new real-estate cadastre that was established recently for the whole Slovenia could be effectively used as an input to the disaster risk management process when this approach is brought into practice.

No direct incorporation of climate change consequences into practical engineering approach has taken place so far. Due to the new European Flood Directive, also extreme events (HQ<sub>300</sub>) will be taken into consideration, until now only HQ<sub>100</sub> (traditionally in torrent and erosion control practice) was the ultimate goal. The debris flow events are taken into consideration indirectly in the Water Act (2002), but they are not covered by the bylaws and regulations with regard to floods.

A better cooperation between different stakeholders is needed, starting from ministries, as well as a governmental body such as a Slovenian platform on natural hazards. Also the transition

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from the early warning, recovery or intervention phase into the final prevention/mitigation phase is to be regulated. It seems that the best way to convince the society as well as the politicians to support the integral risk management approach is to work immediately after large events when there is a certain higher level of understanding, acceptance, and self responsibility.

<http://www.mop.gov.si/en/>

<http://www.sos112.si/eng/index.php>

### **3.6 SWITZERLAND: FEDERAL OFFICE FOR THE ENVIRONMENT**

*Peter Greminger, Federal Office for the Environment*

#### INITIAL SITUATION

In the knowledge that the road to providing greater safety for human beings and their facilities is a long one, the Swiss National Platform for Natural Hazards (PLANAT) implemented a strategy change in 1997 involving a shift away from measures based on technical protection against natural hazards to risk-based protection. This development is of long-term significance and should contribute to the sustainable provision of a uniform safety standard throughout Switzerland. This approach incorporates the intention to enable the comparison of the efficiency and efficacy of investments in the reduction of all kinds of risks in terms, i.e. be they in the health or social sectors, in the area of major accident risks or in the area of protection against natural hazards.

The problems to be resolved can be expressed in the form of provocative theses which are intended to stimulate debate.

#### THESES ON THE TOPIC OF PROTECTION AGAINST NATURAL HAZARDS (FLOODING) – CLIMATE CHANGE:

- The damage caused by flooding is increasing despite the existence of legislation that promotes flood protection measures!
  - Because their protective capacities are over-estimated, the risk posed by old flood protection structures is increasing as a result of the influence of climate change!
  - Targeted investment in preventive measures is only possible through risk-based decision making that is related to economic areas (Integrated River Basin Management, IRBM). This approach makes it possible to take climate change into account in the context of preventive measures!
  - Investments in preventive protection against natural hazards are made on a sectoral basis. Therefore there are limits on the optimization of the “prevention model”, from both an organizational and economic perspective!
  - The incentives for landowners to implement the “greater space for streams and rivers” strategy are insufficient to enable this strategy to exert a decisive influence on the flood risk within a reasonable period of time. Moreover, the administrative effort involved is extensive!
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- Due to the sectoral nature of the organizational structures, the generation of added-value through the promotion of the integrated approach to natural hazard management has been severely limited up to now!
- The risk-based decision-making method is the only approach that enables the elimination of existing uncertainties in relation to the assessment and evaluation of hazards!
- The investments made in the efforts to protect human life against different types of hazards, such as floods, epidemics and major accidents, are still not comparable today in terms of either their efficiency or efficacy!
- As long as the risk-appropriate use of investments made to ensure the safety of society is not guaranteed, it will not be possible to achieve a uniform level of safety throughout Switzerland within a reasonable period of time. The “protection against natural hazards” portfolio is strongly influenced by the “catastrophic events”!
- Only risk-based decision-making that also takes ecological and social risks into account in the context of risk assessment leads to sustainable development that is in tune with the requirements of spatial planning!
- To be able to advance prevention efforts and ensure their sustainability, a risk dialogue is urgently required on all decision-making levels for protection against natural hazards!
- The knowledge and experience already available in the Alpine region is not used on either a sectoral or trans-sectoral basis for the organization of the risk dialogue!
- The EU countries will not be in a position to fulfill the EU directive on flood risk assessment and management correctly and in good time because the necessary knowledge is not available and there is a lack of training for risk managers!
- A “lighthouse strategy” that demonstrates the meaning of the sustainable implementation of flood prevention using positive examples of risk management in the Alpine region would provide the EU Member States with an opportunity to implement the objectives contained in the Floods Directive efficiently and effectively!
- The added-value generated by the consistent application of the risk-based decision-making method, in particular with the implementation of a risk dialogue, is underestimated!
- With the risk-based decision-making approach it is possible to promote the individual responsibility of land owners in a targeted way and to involve them more intensively in the protection of buildings and property!

#### INCOMPLETE EXPLANATIONS FOR IMPLEMENTATION DEFICITS:

The binding and comprehensive implementation of spatial planning up to the level of the land owner is inconsistent for the following reasons:

- The lack of development land, in particular in the Alpine communes.
  - Safety has degenerated into a consumer good that does not involve individual responsibility.
  - The concentration of value in already over-developed hazard areas is increasing constantly.
  - Different regional safety cultures and interests give rise to politically motivated arguments which run counter to the efforts to establish a uniform safety standard applicable throughout the country.
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- A risk dialogue between the actors involved in the “prevention model” has only taken place to a limited extent up to now.
- Potential for development remains in the context of intersectoral and cross-border cooperation.

#### PRECONDITIONS FOR RISK-BASED DECISION MAKING

The risk-appropriate use of resources necessitates that the targeted decision-making level is familiar with the hazard potential in terms of spatial distribution and intensity. The same applies for hazard potential and its vulnerability. The necessary validity of the information must reflect the decision-making level involved (strategic, operative, municipality, region, and country).

The incorporation of climate change and its consequences into risk management is only possible through the creation of scenarios. Even inconceivable scenarios should be explored.

Risk management means dealing with uncertainty. Targeted risk dialogue is necessary for the generation of greater certainty for risk-based decisions. It must be kept in mind, however, that the decisions taken are always associated with uncertainties. Whether the decisions are based on the analysis of best guesses and/or stochastic models etc., it will never be possible to precisely define the risk in terms of its probability of occurrence and the extent of the damage it may cause. That means: a physically substantiated mathematical solution applicable over a wide area will not be available for the determination of the risk, with or without protective measures.

The residual risk involved in even the most unlikely natural hazard events must be explored in the emergency planning and, if necessary, be taken into account in the planning of measures.

If integrated natural hazard risk management is to be effective, the effects of the different preventive methods as implemented in the “prevention model” must be known.

The guaranteeing of the correct and target-oriented implementation of natural hazard risk management requires corresponding level-appropriate education and training.

#### MEASURES

- Promotion of training in the area of risk-based natural hazard management.
  - Promotion of knowledge to ensure risk-appropriate land use.
  - Promotion and support of the early recognition of the life-threatening hazards associated with climate change and with avalanche, flood, debris flow and landslide processes.
  - Targeted and consistent promotion of the risk dialogue with all participants and stakeholders for the improvement of prevention and the awareness and acceptance of risk at political and societal levels.
  - Promotion of the transfer of expertise for the optimal use of all possibilities in terms of preventive measures, such as spatial planning, protective forest maintenance, organizational measures, protective structures, prevention for disaster response and reconstruction with a particular focus on early warning. It is important that equal emphasis be placed here on the safety-technology, economic, ecological and social criteria.
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## **4 WORK GROUPS**

The second day of the expert hearing was dedicated to the intense discussions in work groups. Work group 1 dealt with the aspect of recovery and reconstruction, work group 2 with preparedness, having the focus on risk prevention.

### **4.1 WORK GROUP 1: RECOVERY**

*Moderator: Marko Komac*

The role of “recovery” in risk management was discussed in work group 1. From a general point of view the present panel of experts agreed that recovery is just one of all equal puzzle pieces of the risk management cycle. But regarding its role in society, a differentiated view is needed. Recovery doesn’t mean protection works only. There are also private protection measures, the part of private insurances and public subsidies which need to be taken into account. Therefore the discussion was divided into

- the private sector and
- the public sector.

#### **4.1.1 PRIVATE SECTOR**

After an event has taken place, not only technical protection works, streets and forests may be destroyed. In most cases private properties are affected, too. Concerned persons usually don’t care about local and regional damages at that time, since they have other existential problems. Often they lose their personal belongings or even family members. After overcoming the first shock and starting the repair work the question arises who will pay for the losses occurred? Some of them are just overwhelmed by an extreme event and never anticipated that they could be concerned. Others are actually well informed about the hazard zone they are living in, but wouldn’t accept the recommendations of experts in the past. Most of them didn’t insure themselves against water related disasters and just trusted in public authorities to grant financial aid. But is it the public’s responsibility to take care about the funding of private damages in fact? This question is discussed afterwards within the public sector section.

The idea of a risk dialogue can’t work very well as long as one is not willing to realise the facts. Obviously most people don’t care about the risks they are exposed to as long as they haven’t been actually struck. Furthermore, water related hazards evidently suffer from “image problems” since they occur irregularly. The time between two floods in the same region for example can take 10, 20 or more years. In the meantime experiences and memories are forgotten or suppressed. People are much more familiar for example with avalanches occurring yearly and the connected risks are well-known. Therefore, the recovery phase seems to be suitable to raise the awareness on water related hazards and to take part in risk communication. But only for a limited period of time and on a certain level, what means as long as the consequences are visible and perceptible.

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Raising awareness on potential water related hazards in some ways is essential. It could help to avoid foreseeable damages, for example when buildings are apparently located in declared hazard zones or flood plains. Even if hazard zone maps are currently not compulsory in all Alpine countries those areas are often well-known, e.g. when they have been damaged already in the past. Anyhow, affected landowners often don't move though scientists or policy makers recommended doing so, and even not when they would have received subsidies or financial compensation. Possible reasons for this irrational and incomprehensible behaviour are a lack of self responsibility and naturally also personal aspects. Houses are not only constructions. Houses are "home" and "memories", values which can't get calculated and compensated.

However, the reliable and self-evident financial support of public authorities leads to a decreasing self responsibility in many cases. Beside the above mentioned sensitive aspects, people don't realise the need to move or at least to upgrade their individual protection level by appropriate measures of redevelopment. They expect the municipality or the state to compensate bigger parts of occurred damages, and most often this proves true. In this regard the question comes up, if it is really reasonable to provide public funding for recovery. Also this matter is discussed afterwards in the public sector.

For the private sector "recovery" can rather be considered as chance. A chance to raise the awareness of private people on potential water related hazards and consequently to increase their self responsibility and the level of individual protection.

But how can self responsibility get increased? This seems to be the biggest challenge of recovery in the private sector. One possible strategy which has been discussed within work group 1 could be a more rigid legislation for future building measures. Citizens normally don't know the different materials which were developed by experts in the meantime. They aren't aware of water related bench marks which have been defined due to recent events (80-years floods, 100-years floods). Self created protection measures may fail. Therefore, landowners need consultation and attendance of professionals. In order to ensure abidance by the laws, a system of penalty and incentives could steer the success. In any case people must be made aware of the measures' positive or negative consequences. Naturally this approach doesn't really increase self responsibility, but can help to start a more responsible behaviour.

On the whole, the discussion showed that private and public sector are very closely connected. Finally two open questions lead to the public sector:

- Is it the public's responsibility to provide public funds for private recovery measures?
- Is it really reasonable to provide public funds for recovery?

#### **4.1.2 PUBLIC SECTOR**

The discussion about recovery in the public sector started with the allocation of public funds for private properties issue. Against the background of insufficient self responsibility the answer seems to be clear. But in reality the situation is much more complicated.

One problem is the consciousness of potential water related hazards. But even experts can't foresee exactly any kind of water related risk or which country, region or valley could be affected next time. How should then normal people be aware of them? Climate change still

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implies too many uncertainties at the present state of climate research. To take part in the risk dialogue after an event could help to close this gap partially. But flash floods for example are definitively unforeseeable and can occur anywhere and anytime.

The present different approaches of the Alpine countries can't be implemented as strict as they planned to do.

- Bavaria for example provides financial support by law only for those who can't get private insurance for flood events. This applies to approximately 3 % of all private buildings. But in reality people affected by a natural event got financial support by the public authorities anyhow. The background is the pressure of public media on the one side, but also the misery and expectations of voters. How would people react, if public authorities wouldn't support those unfortunate families who lost everything?
- In Austria private persons can apply for financial aid up to a maximum of 50 % of the loss occurred. The subsidies are provided by a catastrophe fund set up in the 1960s, aiming at the financial support of prevention and recovery measures. The fund is financed by parts of the income tax, tax on wages, gains tax and corporation tax. In this case public authorities don't run the risk of bad image, but the result is a significant decrease of self responsibility.
- The Italian system covers damages only in the case of emergency, i.e. during the event and just for temporary solutions. With regard to the broad range and frequency of extreme events in Italy (earth quakes, droughts, floods, avalanches etc.), this doesn't seem to be the perfect way due to the fact that private insurances don't insure recovery measures.

So, the first challenge in the public sector is to improve the national financial systems for recovery measures, composed of public funds, private insurance and private money.

Recovery in the public sector also includes the reconstruction of existent technical protection measures. New data resulting from design events for example could help to improve their safety. Beyond that, a careful analysis of events is of basic importance for recovery since it is not sufficient to reconstruct them as they have been before. Naturally it is necessary to strengthen their resilience. Partly damage should be taken into account and in some cases be accepted. It isn't necessary to recover each structure, and not at any cost with regard to a reasonable cost-benefit analysis. Besides, maintaining existing protection measures saves funds.

Not everybody is convinced of the necessity of recovery, mainly in the field of water related events since they occur rarely. Only during a small time slot after an event has taken place, people and also administration are willing to make space available and invest money for new measures and the reconstruction of old ones. But this is not enough. Experts want to avoid bigger damages e.g. in the case of overloading or by controlled flooding, and naturally they want to minimise the discrepancy between costs and benefit. Climate change could be a good tool, a kind of "teaser" to enhance the acceptability of investments for new and bigger protection measures, but also recovery.

Summing up the role of recovery in the public sector one can say that it should include a harmonised and convenient financing system comprising public funds, private insurances and private money. Furthermore, recovery in this regard means also evaluation of necessary

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measurements, maintenance, strengthening of their resilience and improvement, taking into account experiences from design events and the results of a careful event analysis. And lastly the time of recovery should be used to convince people and public authorities that investments are necessary.

### **4.1.3 RECOMMENDATIONS**

The work group finally aimed at expressing recommendations for public authorities, regional and local stakeholders, the general public as well as scientists. Thus, the panel of experts summed up the following proposals, which are based on the different gaps identified within the discussion before.

#### **INCREASING SELF RESPONSIBILITY OF PEOPLE**

This task is dedicated especially to municipalities, their mayors and land use planners. However, neither the local policy makers nor people themselves are in fact aware of the potential risk. Therefore, the self responsibility needs to get supported by experts. They know how to optimise individual protection measures and whether there is no other choice than to move.

People should be aware of the risks they are exposed to. This includes residual risks in case of extreme events exceeding the design of protective constructions. Those who have been affected by a natural disaster in the past tend to suppress experiences and memories. To avoid that extreme events are forgotten, a coloured line on the house walls along a river, as they did it along the Mangfall river in Bavaria, marking the water level from a recent flood event, could be a suitable method. The line shall raise the awareness on the event constantly and increase self responsibility and prevention.

#### **IMPROVING FINANCIAL SUPPORT SYSTEMS**

Public authorities but also private insurances are asked to improve their systems, to identify responsibilities and to complement each other, while private people shall be informed that they need to insure their properties themselves.

Financial support of public authorities should be divided into recovery and prevention measures, what allows the most effective use of investments. But even if investments in risk hotspots imply the highest level of risk reduction, they should be improved anyhow.

#### **BE PREPARED FOR THE NEXT EVENT**

Continuous maintenance of existing protection measures, strengthening their resilience and a careful event analysis may help to avoid further, bigger damages in the future. A critical self assessment shall help to identify weaknesses of present technical protection measures showing the consequences of an overloading of the system. The time after an event has taken place can be used to document and evaluate it in detail.

## **4.2 WORK GROUP 2: RISK PREVENTION**

*Moderator: Peter Greminger*

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The discussion in work group 2 focused on two main items, which are summarised in the following sections:

1. State of the art of risk prevention in the alpine countries and biggest successes in the past 20 years
2. Common recommendations for improving risk prevention

#### **4.2.1 STATE OF THE ART OF RISK PREVENTION IN THE ALPINE COUNTRIES & BIGGEST SUCCESSES**

##### AUSTRIA

In Vorarlberg, technical flood prevention measures proved rather successful in recent years. Protective works did function well. Critical constructions, especially constructions which are susceptible in case of overcharging, have been avoided as far as possible. With regard to climate change, avoiding such constructions gains even more importance. In addition, the preservation and maintenance of appropriate protective works is certainly of major importance for the future. As far as monitoring is concerned, Vorarlberg is still in an early stage. Monitoring has to be further developed and extended as far as possible, amongst others in order to cope with cases of overcharging protective works. Hazard zone maps exist and are implemented for the whole area of Vorarlberg; they are accepted by the public to a large extent.

From the national point of view, the flood events 2002 and 2005 were essential. As a consequence, two comprehensive programmes were initiated: Flood Risk I and II. Flood Risk I was the first interdisciplinary analysis of the flood management system in Austria, finally coming up with new flood protection strategies. Flood Risk II treated amongst others for the first time legal aspects in detail as well as very sensitive issues such as relocation of settlements or intersectoral cooperation of the different authorities. Implementation of the elaborated proposals is lacking, however. This concerns especially the distinct differences between the well-established Austrian hazard zone map and the EU Flood Directive approach (which aims at less detailed and precise hazard and risk maps – this would be a step backwards in Austria).

Nevertheless, the recent “revival of natural hazards” in the Austrian legal system, the related efforts to strengthen the execution of natural hazard regulations and the connected sensitisation can be regarded as the biggest recent success, as there are now more concrete legal formulations (e.g. building prohibition in yellow zones). On the other hand, this is also the biggest future risk, because hazard and risk maps now have a binding character. Authorities, municipalities and mayors now have a much higher responsibility and risk legal consequences if they disrespect natural hazard regulations and information – in the end, this could even obstruct decision making.

##### BAVARIA

The “Flood Protection Action Programme 2020” is based on three pillars: natural retention, technical flood protection and flood precaution. Due to the extreme flood events in 1999 and 2005 and the enormous damages caused, the reconstruction approach prevailed in the last years in order to restore a certain protection level or even achieve a higher level. Therefore the focus was rather on technical measures, while prevention had a lower priority. The 15% climate

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factor (100-year discharge +15%), which has been introduced in Bavaria with regard to climate change, is considered as a big success. Although the dimension of the 2005 events was comparable to 1999, the damages were distinctly lower. This underlines the importance of preparation. In this context, the short time lag between these extreme events plays an important role, because people's risk awareness was in that case still rather high. But in more general terms, there is a gap between people's risk awareness and real action for individual risk prevention. The responsible authorities are trying to improve this situation by sensitisation measures.

Unlike Austria, Bavaria does not apply hazard zone mapping. However, the State Offices for Water Management identify flood prone areas, which are then officially constituted by the district administration. Such flood prone areas serve as flood retention areas and have distinct legal consequences in terms of restricting settlement development – this approach can be regarded as a big success in terms of prevention. In addition, the Bavarian Environment Agency is currently generating geologic hazard index maps for the Bavarian Alpine Space as support for future development decisions of the municipalities (without subsequent development restrictions – but still a success, especially as one insurance company already took the hazard index map practically into consideration). Representatives of the Bavarian Environment Agency present the maps three times in each municipality, which already proofed a successful approach (“transparency is the key to acceptance”). Outside the Alpine Space, the “Flood Action Plan Main” represents a pilot project with elements of a flood risk management plan.

Furthermore, the Bavarian flood warning service is pointed out as an important information and damage prevention instrument. However, its benefit is limited for Alpine torrents because floods usually occur there in very short time.

#### SWITZERLAND

The hazard map has to be regarded as the basis for all prevention measures in Switzerland. Its history goes back till the end of the 1960ies. At that time, spatial planning law claimed to identify endangered areas. However, this happened only for avalanche prone areas. At the beginning of the 1970ies, areas endangered by natural hazards as well as areas worth protecting were determined in the whole country and compiled in very rudimentary maps (1:100.000), basically differentiating “endangered”, “potentially endangered” and “not endangered” zones. On this basis, a large number of protection projects and constructions were set up, but in the 1980ies it became obvious that not every protection measure can be financed. Thus, from the end of the 1980ies different authorities attended to the natural hazards issue intensively, but leading to a fragmentation of responsibilities. Today, the natural hazards responsibilities are reasonably merged in the Federal Office for Environment.

The floods in 2005 showed, however, that Switzerland is still far away from the aspired extent of implementing risk prevention and preparation. First of all, it turned out that the short- and medium-term warning services have to be improved. But above all, the need for prevention still isn't on people's minds. This is not only true for the population, but also for the Cantons' and municipalities' spatial planners and building control. Therefore, planning and building law and their application should be correspondingly enhanced as well as sensitisation processes and a comprehensive risk dialogue initiated, not only with authorities, but also with insurance companies and the population.

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## SLOVENIA

In Slovenia, preparation is not applied in an ideal way at the time being. Civil protection is organised quite well, but a “risk culture” and an appropriate education are lacking and should be developed. The water law of 2002 regulates all water related problem fields, also concerning torrents and landslides. The legal provisions can be regarded as sufficient (also due to several EU directives). However, there is a gap between theory and practice respectively implementation. For example, there are no river basin plans although stipulated by water law since 2002. Also the required “water conferences” do not take place, which are intended to involve people in river basin planning. Furthermore, compulsory up-to-date hazard zone maps do not yet exist. Thus, related experiences of how to establish such plans and expert staff is lacking. But hazard zone maps could potentially be enforced as a part of river basin plans (not as separate plans). In this respect, the EU directives requiring hazard and risk plans are definitely a benefit for Slovenia, as the pressure on policy to set up such plans is rising and the country can learn from foreign experiences.

The situation for technical prevention is partially similar. The protective measures and constructions are rather simple, because experiences are limited. Also the “insurance culture” is still underdeveloped, although people can insure against floods and since a few years against landslides, too. Nevertheless, the existing protective works proved successful, as the natural hazard related number of casualties and damage extent was very limited. But maybe climate change could be used as a mean to further improve the situation.

On the whole, Slovenia is hardly lagging behind the other countries in terms of legislation. But in terms of implementation, one could estimate that Slovenia is approximately 15 years behind.

## FRANCE

In France, the main prevention tool is the plan for prevention of natural hazards (PPR). A specific characteristic of this tool is that the elaboration of hazard maps and risk map is separated. The PPR procedure includes a phase involving municipalities in negotiating the question “what is a risk?” on the basis of the hazard map, integrating the vulnerability issue. But it is not clear yet whether such a discussion approach is the right way.

A new tool is the safety measures plan (PCS) which aims at organising safety and rescue action in municipalities in case of catastrophes; they also take into account extreme events and climate change. Unfortunately, the first safety measures plans are not optimal, and also the coordination and communication between PCS and PPR has to be improved. By and large, it can be stated that France has adequate tools in theory, but not they have to be put into practice.

The biggest French prevention success can hardly be identified, because appropriate methods of success evaluation and the necessary data are lacking.

## 4.2.2 RECOMMENDATIONS

Following the state of the art presentations, the group discussed the need for action in the field of risk prevention and the question of how to integrate the climate change issue. The discussion results were summarised in the form of recommendations, which are listed below (comments from the subsequent plenum session included). Basically, all these proposals have a more or less

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strong link to the education of policy, administration and the population in terms of risk prevention (“learning society”) and to increasing people’s self responsibility.

#### BETTER IMPLEMENTATION OF EXISTING KNOWLEDGE AND TOOLS

Generally speaking, most Alpine countries already have broad scientific knowledge and technical experience in the field of torrential risk management as well as a range of appropriate tools – but putting knowledge into practice and applying tools has to be strengthened distinctly. This includes particularly also the experience exchange on an international level. Implementation shall always have a sustainable character, especially in terms of investments. As a basis, the responsible authorities and intervention forces have to be educated regularly, and also the population in endangered areas should be made aware of the respective risks in order to raise self responsibility.

#### OVERCOME THE SECTORAL RISK PREVENTION APPROACH

One general requirement for enhancing the effectiveness of existing tools is a better intersectoral coordination between the concerned authorities. In most countries, the responsibility for different natural hazards types is allocated to a number of ministries, agencies and departments often on different administrative levels. This fragmentation in many cases makes risk prevention complicated, time- and resources-consuming. Therefore, the cooperation and coordination between the responsible units and their tools should be enhanced distinctly.

#### FREEDOM FOR REGIONAL DECISIONS

Most risk prevention tools originate from the national levels of the Alpine countries. Common standards on national level make certainly sense. For the regions and municipalities, however, it is very important to maintain a certain degree of flexibility and freedom of decision concerning the tools’ application, because regional and local framework conditions are very different in the Alpine space. As regards for example hazard maps, their concrete on-site consequences should be discussed and decided upon in a democratic process by the concerned territorial units themselves.

#### RISK GOVERNANCE, RISK-BASED DECISION MAKING AND RISK DIALOGUE

Risk governance has to be implemented on all levels from national to local. With regard to flood risk management, the territorial focus should always be on the river basin, because it constitutes a natural unit. A basic prerequisite for effective risk governance is again education and sensitisation, especially for risk dialogue processes with the local population. Risk-based decision making should enable decision makers to identify the hot spots with prior need for action and to compare potential prevention measures from all relevant perspectives (economic, ecologic, social) in order to achieve the best cost-benefit ratio. Such risk-based decision making has to take place not only at national, but also on regional and local level.

#### CONTINUITY OF MAINTENANCE

Maintenance of prevention construction is of course essential. In future, probably a lot of investments in maintenance will be necessary to guarantee the stability and functionality of constructive works. However, maintenance also means to educate people involved in rescue

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services and to improve their skills as well as to keep up respectively enhance self responsibility in terms of private risk prevention.

#### IDENTIFYING THE RETURN ON INVESTMENT

In order to enhance the political and public status of risk prevention, larger measures should undergo control of success in terms of damages avoided – even if this is still a rather new field and correspondingly difficult at the time being. However, it seems worth increasing respective efforts and trying to argue risk prevention more in economic terms, because this is the language policy makers and the public understand much better than complex technical expert terminology.

#### IMPROVEMENT OF EARLY WARNING AND EMERGENCY PLANNING

Very early warning already works quite well in most countries, e.g. with the help of hazard maps, risk maps etc. But in the field of early warning, i.e. warning well in advance of an event, and local emergency planning there is still a lot to do. For example, early warning tools have to be better coordinated in general. Furthermore, when it comes to precipitation and flood warning, the information basis on which local authorities and municipalities have to decide upon triggering an alert or not has to be improved in terms of spatial and temporal resolution. But it's clear, that this is a rather challenging task for the future.

#### SELF ASSESSMENT, LEARNING FROM MISTAKES AND GOOD EXAMPLES

Self assessment is already quite well done by rescue services. This is partially also true for authorities responsible for hazard and risk mapping as well as for engineers concerned with protective construction works. Nevertheless, self assessment should be further strengthened and extended. Thereby, a new culture should be established which is more open for admitting and learning from mistakes, thus providing better opportunities to subsequently find solutions respectively identify possibilities to avoid such mistakes in future. On the other hand, good examples of prevention practice should be even better capitalised and shared. But as long as the natural hazard responsibilities are intersectorally fragmented, self assessment remains a very challenging task.

## 5 OUTLOOK

Following this expert hearing, the Bavarian State Ministry of the Environment and Public Health is going to carry out two further events in 2010 in close collaboration with the Bavarian Environment Agency:

- Experience Exchange Workshop for Practitioners on 21<sup>st</sup> / 22<sup>nd</sup> of April 2010 in Immenstadt, Allgäu
- Implementation of RiskPlan in a Bavarian municipality on the 9<sup>th</sup> of July 2010 in Immenstadt, Allgäu

These events will be based on the results of the expert hearing and aim at further examining risk management potentials and implementing first respective steps in the Bavarian Alpine Space. In this frame, it should also be tested whether these tools are suitable for achieving the expected results or if improvements are necessary.

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## **6 ANNEX 1: EXPERT HEARING PROGRAM**

### **November 5, 2009**

12:00	Registration
13:00	Welcome address
13:15	Introduction
13:30	Report on Expert Hearing in Bolzano, 2009
13:45	Report on Expert Hearing in Vienna, 2007
14:00	National Statement Austria
14:15	National Statement Bavaria
14:30	Coffee break
15:00	National Statement France
15:15	National Statement Slovenia
15:30	National Statement Switzerland
15:45	Discussion of the Statements
17:00	Organisation of work groups
17:15	End of the day

*Moderation: A. Rimböck, Bavarian State Ministry of the Environment*

### **November 6, 2009**

08:15	Discussion in work groups
	Work group 1: Recovery
	Work group 2: Risk Prevention
09:45	Presentation of the results
10:30	Coffee break
10:50	Common discussion
11:50	Conclusion, Recommendations
12:00	End of the day

*Moderation: F. Rudolf-Miklau, Federal Ministry of Agriculture, Forestry, Environment and Water Management*

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## 7 ANNEX 2: LIST OF PARTICIPANTS

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