Watershed Management in Mountain Areas

19 – 22 August 2008
Report Switzerland
Watershed Management in Mountain Areas

Watershed Management in Mountain Areas – EFC Oulu 19–22 August 2008
Dr. P.J. Greminger, FOEN
Main information

- Revision of the forest legislation
- New financial equalisation
- Lessons from the storm events of 2005
- Hazard prevention
- Risk management
- The Riskplan software tool
- Organisational development
Revision of the Swiss federal forest act
Content of Programme Agreements

- Protective forests (natural hazards)
- Countermeasures
- “Renaturalisation“ of rivers
- Ecological compensation, biodiversity
- Protection of mires and landscape
- Conservation areas for game and aquatic birds
- Forest management
- Conservation areas
- Elimination of nitrogen (water ressources)
- Countermeasures against noise and sound
Lessons learned from the floods in 2005
Damage Caused by Natural Hazards in 2005
(flooding and landslides)
Problems

Damage still increasing

Flood damage statistics (since 1972)

9 billion € in 36 years
Ø 300 million € per year
Financial Contributions from the ES-Pool for Selected Major Events since 1978

- 1978 Überschwemmungen im Tessin
- 1986 Hagelschäden in Genf
- 1987 Überschwemmungen UR, VS, TI
- 1990 Stürme ganze CH
- 1993 Brig, Lago Maggiore
- 1994 Hochwasser
- 1999 Feb. Lawinenwinter
- 1999 Mai Hochwasser
- 1999 Dez. Lothar
- 2000 Unwetter VS, TI
- 2005 Überschwemmungen ganze CH

Million CHF

<table>
<thead>
<tr>
<th>Event</th>
<th>Year</th>
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<tbody>
<tr>
<td>Opening of the Learning Station</td>
<td>1978</td>
</tr>
<tr>
<td>Arosa/Langwies, ASA insurance company</td>
<td>1999</td>
</tr>
<tr>
<td>1978 Überschwemmungen im Tessin</td>
<td></td>
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<tr>
<td>1986 Hagelschäden in Genf</td>
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<tr>
<td>2005 Überschwemmungen ganze CH</td>
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</tbody>
</table>
Resources Invested by Actors

- Confederation: 16%
- Cantons (Regions): 11%
- Municipalities: 14%
- Private/Insurances: 59%
Resources used and differentiated by hazard processes (public money)

- Extreme temperatures (heat, cold) 5%
- Storms (Wind) 18%
- Floods 30%
- Thunder Storms 13%
- Earthquakes 13%
- Erosion 11%
- Avalanches 10%
Resources used and differentiated by hazard processes (insurance money) 1971-2007

Opening of the Learning Station Arosa/Langwies, Insurance society ASA

Flooding: 66%
Storm (wind): 17%
Rockfall: 1%
Landslide: 1%
Avalanche: 2%
Hail: 8%
Rockslide: 1%
Snow pressure: 3%
Increase in Risk at Local and Global Level

Different kind of risks!

Intensity of load

Space for nature

Vulnerability

Living Space

Economic Space

TU- München Prof. Suda
Publications - Guidelines

- In 1997/2005, the Federal Office for the Environment published guidelines for the compilation of hazard maps, the delineation of hazard zones, the issuing of building codes etc.

- Methods to analyse natural hazards - a risk based approach. 1998. 247 S.
Hazard Mapping

January 2008: 50% completed

Deadline 2011!

Copyright BAFU
Best Practice – Good Examples

Engelbergeraa

Return on Investment 2005:
130 Million CH Francs

Avoided damage:
160 Million CH Francs

Investment in preventive work:
30 Million CH Francs
Conclusions – Strengths

• The quality of the hazard maps is good; endangered areas were correctly detected.

• The municipalities take the hazard maps into account in land-use planning.

• Due to appropriate land-use planning and building codes severe damage could be partly reduced.

• Good practice shows the efficiency of measures taking into account the residual risks (“overload case”).

R. Loat, FOEN 2008
Conclusions – Weaknesses

• Only about 50% of the hazard maps have been completed.

• The incorporation of the hazard maps into the local land-use plan takes 3-4 years.

• The risk awareness must be strengthened through risk analysis and risk dialogue.

• Collaboration on all administrative levels and with the different stakeholders must be improved (optimising implementation).

R. Loat, FOEN 2008
Integrated Natural Hazard Risk Management

Assessing Hazards and Risks

Optimisation is the main challenge for our future work!
Challenge for the Future

Gefahrenbeurteilung
Szenarien
Wahrscheinlichkeiten
Intensitäten
Prozessräume
Bericht

Risikokarte

Intensitätskarte

Interventionskarte

HQx

Dimensionsgrundlagen

Massnahmenplanung

Notfallplanung

Objektschutzplanung

Versicherungsplanung

Finanzplanung

Raumplanung

G.R. Bezzopla et. al. BAFU2008
New Concept – Based on Risk Analysis

- "Total safety"
- Optimal forest management
- Protection Target
- Target of the risk-based forest management
- Unmanaged forest
- Jungle
- Without forest

Increase of the safety level

(Josef Hess Diss 2008, ETH-Z)
Main questions we have to answer to do risk based decision management

• What could happen?
• What is not allowed to happen?
• What could we do that it does not happen or at least to reduce the risk in a sustainable way?
• How much money are we ready to invest?
Target profiles describe stand conditions which should have a strong protective effect.

Figure 1: The goal of protection forest management is to ensure a forest is as effective as possible in reducing hazards.
The need for action is the result of a comparison between the expected state of the forest in 50 years with the minimum profile.
Calculation of Risk in P-D Diagram

Risk before measures
Risk following counter-measure
Risk Reduction = Effectiveness

Calculation of Risk in P-D Diagram

Probability

Risk before measures
Risk following counter-measure
Risk Reduction = Effectiveness
## A pragmatic approach to regional risk-based management and decision-making

<table>
<thead>
<tr>
<th>Step One</th>
<th>Definition of space, region or objects which should be considered as a closed Management System of risks</th>
</tr>
</thead>
</table>
| Step Two | Definition of Damage Potential  
 a. Natural hazard processes and it’s intensity as a function of space  
 b. Technical hazard processes and it’s intensity as a function of space  
 c. Others |
| Step Three | Definition of Damage Potential  
 a. Vulnerability of Human Beings;  
 b. Vulnerability of Infrastructure and buildings;  
 c. Vulnerability of economy;  
 d. Others |
| Step Four | Calculation of risks. Based on scenarios, probability of occurrence as well as probability of damages. |
| Step Five | Risk dialogue about existing risks and there evidence. |
| Step Six | Evaluation of possible risk reduction measures based on the protection targets and the effectiveness of measures. |
| Step Seven | Risk dialogue about the optimal mix of risk reduction measures, the necessary investments and the uncertainty level. |
RiskPlan supports a pragmatic approach to regional risk-based management and decision-making

Mandatory information

<table>
<thead>
<tr>
<th>Obligatorische Angaben</th>
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<tbody>
<tr>
<td>Vorname</td>
</tr>
<tr>
<td>Nachname</td>
</tr>
<tr>
<td>Email</td>
</tr>
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</table>

Registration

The RiskPlan platform has an automatic registration system. Due to the confidentiality of the platform data, registration is essential. The data are only accessible to registered and authorised users.

www.riskplan.admin.ch G/F/E
RiskPlan: a Tool to Aid Optimisation

System Definition

Definition of the system (Space)

Region 1
Space of Objects 1

Region 2
Space of Objects 1

Region n
RiskPlan: a Tool for Analysing the Possible Consequences of Climate Change

Definition of space to be analysed:

- Example object space
- Example of a region
- Example analysis space
**RiskPlan – Climate Change (Test)**

<table>
<thead>
<tr>
<th>Szenario</th>
<th>Normaler Verlauf</th>
<th>Ungünstiger Verlauf</th>
<th>Katastrophaler Verlauf</th>
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<td>5 80 CHF</td>
<td>310 CHF</td>
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RiskPlan – Climate Change (Test)
Cross Border Knowledge Exchange

Good Example EngelbergerAa

Visit by the natural hazard experts from South Tyrol

Discussion about Risks and Riskplan

Relief Measure Engelberger Aa
RiskPlan tested by different WP6 Partners
Best practice example: Korinthia

HAZARD MAPPING FOR CHILDREN
PR - «protection.forest.humans.» project
funded by insurance companies

The protective forest a countermeasure to:

- Flooding and debris flow
- Avalanche
- Rockfall
- Landslide

→ Protective forest contributes to the prevention of damage
→ Prevention is a necessary condition that enables insurance of the risk of damage arising from natural hazards!

www.schutz-wald-mensch.ch
Example of an Installation for Learning about Balance in a Protective Forest
Challenges for the promotion of mountain watershed management

- The integrated approach will only be effective if sectoral planning and action are replaced by the integrated perspective on all the relevant levels.
- Greater use should be made of the existing potential for the creation of added value through the use of experience and knowledge of the operative and practically active mountain population.
- The cross-border exchange of knowledge and experience of operative and practical activities in the mountain region should be promoted using suitable measures.
- Climate change does not stop at national borders and for this reason, all kinds of joint cross-border projects on a very high quality level and with extensive preventive effects are particularly worth promoting.
- Risk dialogue must be recognised and used as the key element for participative risk-based planning, decision-making and action.
Climate Change in Dubai – Are we competitiv enough with our preventive work?