Adaptation to climate change in Switzerland‘s natural hazards management policies

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Glacier melting, Permafrost melting, Landslides 2006, Landslide dam, Lake outburst > Floods

Prevention Monitoring Hazard Map
2 Staff members killed
Training for staff: processes

Informations
Event evolution
Return Period (years)

Ref. Period: 1901–2004

(MeteoSchweiz 2005)
Damages in Switzerland

Ø 300 Mio CHF /year
Climate Change in mountainous regions

Problems

- More intense land-use and increasing economic value in areas where climate and environment is changing
- Increasing vulnerability of buildings and infrastructure
Swiss experiences

Sustainability

1. Consider and balance the three main factors

- Economic aspects
- Environmental aspects
- Social aspects / safety
Swiss experiences

Integrated approach

2.

response

mitigation

recovery
Swiss experiences

3. Swiss experiences

Partnership

- authorities
- population
- politicians
- private economy
- research
- insurances
Permafrost – Landslides Rockfalls

Matterhorn Cervino VS
8.2003, closing the path

Dent Blanche VS
2.8.2003, 0.30 am 3500 m ü. M. V > 30'000 m³

Responsability; Population – Authority. Process: Melting Permafrost: more slope instabilities
Permafrost - Maps - Modelling
Permafrost – Monitoring – Satellite Map

Hungerli (VS) Rock Glacier and Permafrost (INSAR 105d)

(GEOTEST, Gamma)
Permafrost - Monitoring (PERMOS)
Mountainous regions, problems

- Space for living and livelihood is limited
- Safe places and those at risk are close to each other
- Access in times of disaster is difficult
- People’s risk perception is very particular
- Multi-hazard conditions prevail
- Processes are fast, climatic influence
Brienzi 23.8.2005  Flood area, no reconstruction in id. (?
Flood Prevention

Riverbed x 5 -> more space

Human activities

meanders

riverbed
Flood protection

- **Meteorology**
- **Hydrological hazard**
- **Catchment area**
- **Riverbed**
- **Vulnerability**
- **Risk of flooding**
- **Risk of damage**
- **Damage**

**Integrated approach**

- **Retention in the area**
- **Aforestation, increase of infiltration, ...**

- **Structural protection measures**
- **Increase of river bed capacity, dikes, ...**

- **Appropriate land use retention areas, protection of single structures, ...**

- **Emergency measures**
- **Forecast, rescue, temporary measures, ...**

- **Minimization of residual risk**
Sustainability in the field of flood protection means …

Not only consider safety concerns but also take into account ecological aspects

Key element: Space for the rivers
Hazard maps

**red zone**
high risk for constructions and people inside houses
  - no new constructions allowed

**blue zone**
medium risk
  - constructions allowed with restrictions

**yellow zone**
low risk
  - informations for the ground-owners

**yellow / white zone**
residual risk
  - pay attention in case of special objects / planning of emergencies
Hazard maps, avalanches

Stand: 23. August 2004
22 Kantone

Legende
GK Lawinen
Ja + raumplanerisch umgesetzt
Ja
In Bearbeitung
Geplant
Teilweise
Nein
Nicht nötig
In Bearbeitung
Hazard maps, floods

Stand: 25 August 2004
22 Kantone
reduce the resulting risks to a bearable level
Risk Management

integrated approach

Preparedness
- education
- training
- action plans
- warning
- ...

Prevention
- non-structural measures
- structural measures
- ...

Mitigation

Event

Response

Recovery

Reconstruction
- permanent reconstruction
- ...

Rescue / Relief
- alert
- rescue
- communication

Rehabilitation
- temporary reconstruction
- ...

Integrated approach to Risk Management:
- Preparedness
  - education
  - training
  - action plans
  - warning
  - ...
- Prevention
  - non-structural measures
  - structural measures
  - ...
- Mitigation
- Event
- Response
- Recovery
- Reconstruction
  - permanent reconstruction
  - ...
- Rescue / Relief
  - alert
  - rescue
  - communication
- Rehabilitation
  - temporary reconstruction
  - ...

Risk Management encompasses an integrated approach with key steps including:
- Preparedness
- Prevention
- Mitigation
- Event
- Response
- Recovery
- Reconstruction
- Rescue / Relief
- Rehabilitation
Thanks