


Summer School „Flood risk reduction“, 9.-12. Sept. 2013

Risk perception and risk communication

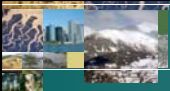
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Content

- Why is research on risk perception and risk communication relevant?
- Research approaches and findings on risk perception
- Case study on risk perception
- Research approaches on risk communication
- Case studies on risk communication
- Workshop / Group work

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Birmensdorf



Davos, SLF



Sion, Avalanche-Lab



Lausanne



Bellinzona




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WSL Research


WSL research is concerned with



Landscape development




Ecosystems and their diversity



Natural hazards

Responsible management of the environment

Combining basic and oriented research



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Responsibility for hazard management

	Before 1850	1850-1990	1990 - today
Philosophy	Living with hazards	Hazard protection	Risk management
Principle	Self-protection (V) Subsistence	Hazard control (p) Military	Cost-benefit (V/p) Market
Main actors	Community / Family	State / Engineer	System actors
Responsibility domain	Collective / Private	Engineer	Society

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Living with hazards (pre-modern)

- Traditionally, the population had to protect themselves individually or collectively.
- It thus showed a passive attitude towards hazards (individual protection or retreat)
- Hazards are just one life condition: no big issue



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Hazard control strategies (Merz et al., 2010)

- Protection of settlements and agricultural areas from hazards of a given probability (100 years events)
- Reducing probability of hazards; vulnerability neglected
- structural measures (e.g. embankments) and emergency training (local)
- Management domain of engineers and civil protection: high trust, high agreement
- Risk perception differences between experts and lay-people of some interest (technological risks)
- Hazard communication not a relevant issue



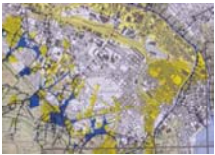



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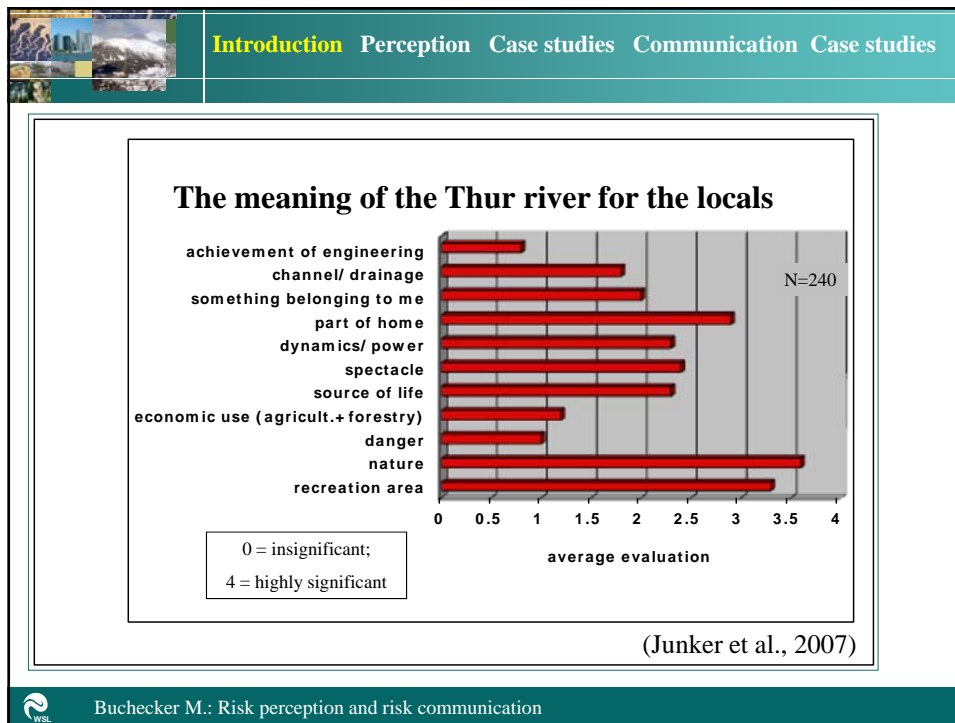
Hazard risk management

- Water Framework Directive (2000); Flood Directive (2007)
- Risk prevention based on costs and benefits
- Mainly spatial planning, risk mapping, early warning and individual prevention
- Integrated approaches (all phases of risk cycle and other system functions: more space for rivers)
- Involving all actors in risk management:
 - Acceptance of risk-levels and prevention measures (revit.)
 - Motivation to implement individual prevention measures (insurance, listen to warning, install prevention technology)
- Risk perception and communication key management issues

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Definition of risk perception

Pidgeon et al. (1992) define risk perceptions as “**people’s** beliefs, attitudes, judgments and feelings, as well as the wider social or cultural values and dispositions that people adopt, towards hazards and their benefits.”

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Risks perception research

- Medical risks
 - Pandemics
 - Individual risks (cancer)
- Technological risks
 - Nuclear risks
 - Gen technology
 - Industrial risks
- **Natural hazards**
 - Flood risks, rockfall, storm
 - Seismic risks, Draught, heat

Research on societal aspects of natural hazards only in recent years

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Research of risk perception

Disciplines of positivist traditions (e.g. psychology):

- Authorative knowledge is only derived from logics and experience
- Society operates like the physical law according to general law: reality

Disciplines of constructivist traditions (e.g. antropology):

- Knowledge is societally constructed
- In society, meaning is more relevant than physical reality

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Dimensions of risk perception research

Epistemological basis of research

Reality Human Construction

Focus of research

Risk type

Risk problem

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Approaches of risk perception research

Epistemological basis of research

Reality Human Construction

Focus of research

Risk type

Risk problem

Psychometric approach

Empirical approach (awareness)

Mental model approach

Cultural theory approach

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Risk assessment versus risk perception

• Experts

Formal-normative:
Risk formula: $R = P * S$

• Lay people

subjektive/ intuitiv:
Mental Risk-heuristics

Attribut dimensions

„objektive“ /
rational

subjektive/
irrational?

Deficit approach!

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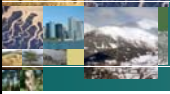
Psychometric approach

Develop methods to quantativel measure psychological dimensions based on statistics and models

Psychometric approach of risk perception:

- Measure deviation of lay people's risk perception from experts risk assessment
- Identify universal influence factors based on standardised surveys
- Relation of individual assessment of specific risks and perceived characteristics of these risks.
- Assess social acceptance of specific risks

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Factors of lay people's risk perception

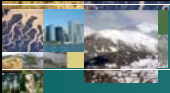
- Personal and institutional control (influence, predict)
- Voluntariness
- Familiarity (new risk)
- Dread (e.g. likelihood to die)
- Artificiality of risk

(Renn et al., 2008)

Factor explain the influence (how much) on perception, not the cause (why)



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Ranking of risks by different target group

Activity or technology	League of Women Voters	College students	Active club members	Experts
Nuclear power	1	1	8	20
Motor vehicles	2	5	3	1
Handguns	3	2	1	4
Smoking	4	3	4	2
Motorcycles	5	6	2	6
Alcoholic beverages	6	7	5	3
General (private) aviation	7	15	11	12
Police work	8	8	7	17
Pesticides	9	4	15	8
Surgery	10	11	9	5
Fire fighting	11	10	6	18
Large construction	12	14	13	13
Hunting	13	18	10	23
Spray cans	14	13	23	26
Mountain climbing	15	22	12	29
Bicycles	16	24	14	15
Commercial aviation	17	16	18	16
Electric power (non-nuclear)	18	19	19	9
Swimming	19	30	17	10
Contraceptives	20	9	22	11
Skiing	21	25	16	30

Slovic et al., 1987



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Developing a method of individual risk assessment (Plattner et al., 2006)

$$r_{\text{perc}} = \text{paf} \cdot \text{eff} \cdot \frac{\sum_{i=1}^n (\text{paf}_i \cdot a_i)}{\sum_{i=1}^n a_i}$$

paf = Perception affecting factors a = laypersons-weights

- Voluntariness
- Controllability
- Endangerment
- Knowledge
- Subjective danger rating
- Subjective recurrence frequency


If $R_{\text{perc}} > \text{Acceptable risk}_{\text{exp}}$
risk communication needed!

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Approach of cultural theory (Douglas, 1986)

- Based on anthropological research
- Risk was not found to be a relevant social category (new concept, first used in trading industry)
- Hazards were found to be mainly relevant for the relationship and the power negotiation with / between institutions
- The relevant question: *why* and *who is to blame* (moral)?
- Normal reaction of lay people after a accident/hazard
- Hazards are also today a highly political issue
- **Relationship to institutions is key for risk (problem) perception**

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Types of relationships to institutions

High
Prescriptions
Grid
Low

Low Group High
Bonding

Isolates Hierarchy
Individualism Egalitarianism

Explains why seemingly absurd reactions are rational.

Tansey, 2004

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Approach of mental model

- Subjective models of phenomena (moderate constructivism)
- Based on the theory of developmental psychology (Piaget, 1978)

Assimilation (fit expected category to objects)

Accommodation (modify categories)

No identical intersubjective perception of reality

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Early approaches of mental model

Object

Experience Information

Mental model

Indiv. behavior

Understand the model to shape the behavior

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The role of the media and risk amplification

Perceiving Valuing Behaving

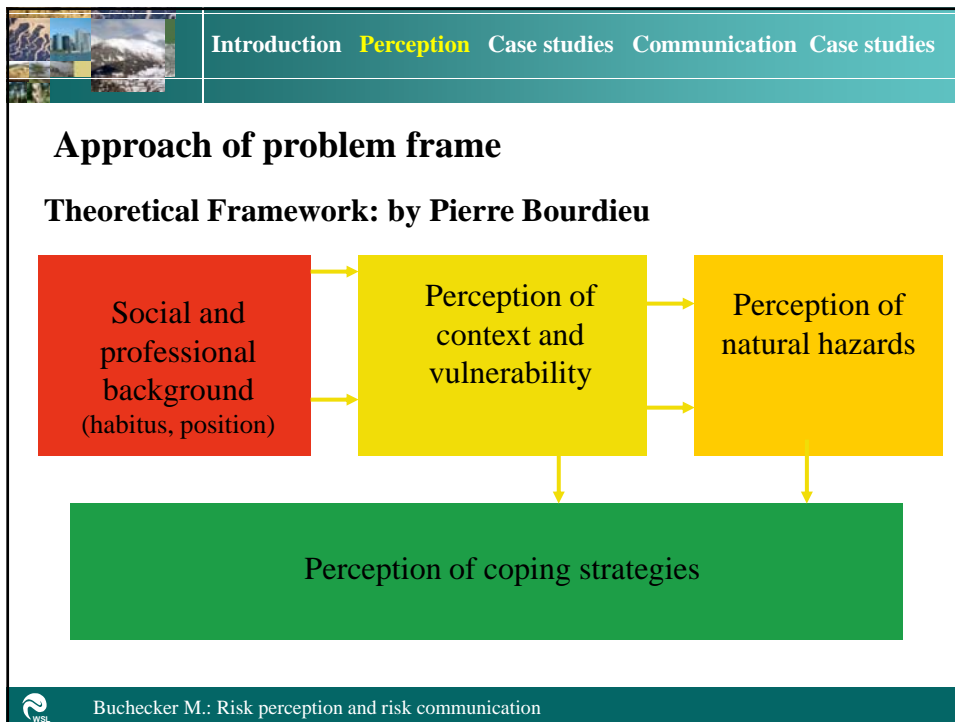
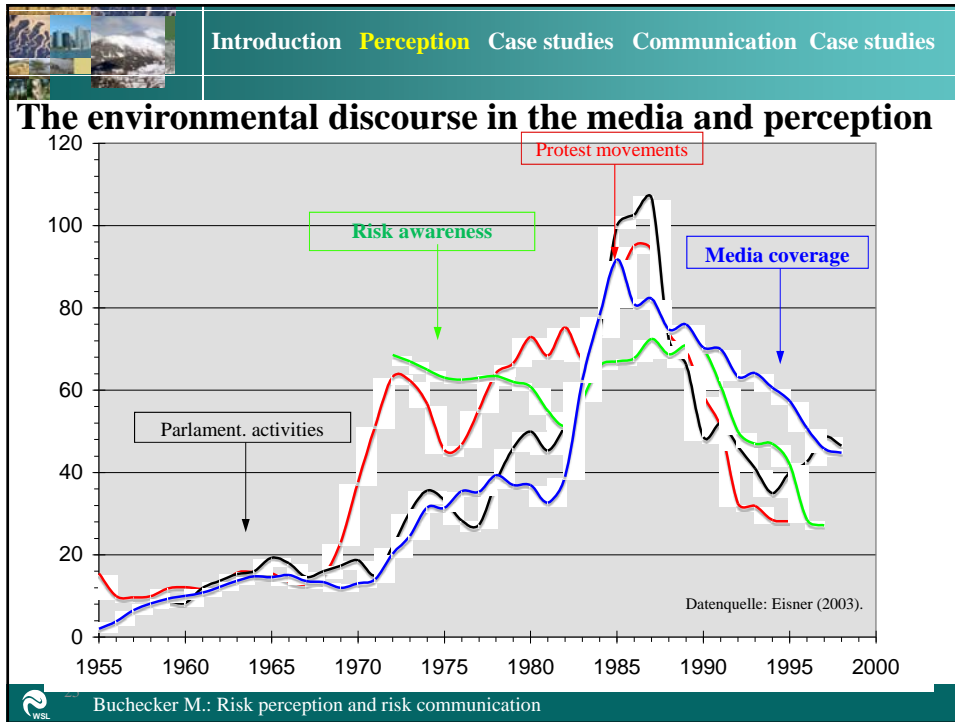
Individual risk perception

Media have an amplification function

Function of the media:

- Information
- Criticism
- Control
- Warning
- Alarming
- Explaining

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Extended mental models: Problem frames

(Kolkman et al., 2007)

(Biggs et al., 2011)

Mental models are buffered by specific perspectives (interests, values and beliefs)

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Hunters' and Foresters' problem perception of a protection forest

Problemwahrnehmung – Plattform Uri 22.2.02

Heeb und Hindenlang, 2005

Identify perceived causes and consequences


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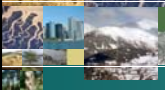


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Risk awareness research

- Empirical research on influence factors of affected people's awareness of specific risks
- Focus on specific contexts
- Focus on standardised surveys
- But: so far no standardised measure of risk awareness (risk perception in terms of probability, severity, worry, relevance)
- Research findings so far inconsistent


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Factors influencing risk awareness (Wachinger and Renn, 2010)

Risk factors	Perceived likelihood of event	+
Informational factors	Perceived magnitude of event	+
	Source and level of information	+
	Media coverage	+
Personal factors	Age	+/-
	Gender	+/-
	Educational level	-
	Experience	+++
	Negative feelings of experiences	++
	Time after last event	++
	Lack of trust in authorities	+++
Context factors	Place of residence	+
	Economic impact / home ownership	-

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Path model on risk awareness and preparedness

```

    graph LR
      FE[Feelings associated with previous experience]
      TP[Trust in flood protection]
      PD[Perceived dread]
      PC[Perceived consequences]
      PL[Perceived likelihood]
      PI[Preparedness intention]

      FE -- "-" --> PD
      FE -- "-" --> PC
      FE -- "-" --> PL
      FE -.-> PI
      TP -- "-" --> PD
      TP -- "-" --> PC
      TP -- "-" --> PL
      TP -- "+" --> PI
      PD -- "+" --> PI
      PC -.-> PI
      PL -- "+" --> PI
    
```

Terpstra, 2011

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Typology of trust in government

General Trust (Reliance)	High	Acceptance (Trust)	Critical Trust
	Low	Distrust	Rejection (Cynicism)
		Low	High
		Scepticism	

Different interests of government perceived (Poortinga and Pidgeon, 2003)

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Integrative framework on risk perception

Four Context Levels of Risk Perception

Collective Influences Personal Manifestations

Cultural Background

Cultural institutions Political, societal and economic culture Personal identity and sense of meaning Worldviews

Social-Political Institutions

Social values and trust Personal values and interests

Cognitive-Affective Factors

Reference-knowledge Personal beliefs

Stigmata Emotional affections

Heuristics of Information Processing

Collective Heuristics Risk Perception Individual Common Sense

Economic & political structures Organizational constraints Socio-economic status Media influence

Renn, 2008

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Local residents' perception of natural hazards based on a mental model approach

Research questions

- How do they perceive natural hazards (including climate change) in the context of **other local risks**?
- What factors shape local risk perception?
- What are the implications for a local risk management?

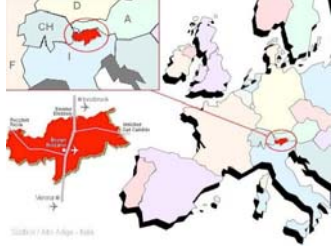
(Jurt, 2009)

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Case Study

Municipality of Stilfs, South Tyrol




3 Fractions:




Stilfs / Stelvio
Main village, 502 inhabitants
Handycraft, teachers, commuters




Sulden / Solda
Mountain Resort, 400 inhabitants
Ski-Tourism (2500 beds)



Trafoi
Pass-Village, 90 inhabitants
Pass-Tourism (650 beds)


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Methods

Antropological field study: 4 Months

- Qualitative Interviews
 - 53 with local residents
 - 9 with experts (administration, science)
- Participatory observations
- Group discussions
- Standardised questionnaire sent to all households
Return-rate: 37%, N=166

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Management of natural hazards in Stilfs

```

    graph TD
      Mayor((Mayor of the municipality of Stilfs)) <--> Experts((Experts of the regional administration))
      LocalComm[Local avalanche commission  
Local fire brigade] -.-> Experts
  
```

- Decisions not transparent
- No public communication about management!

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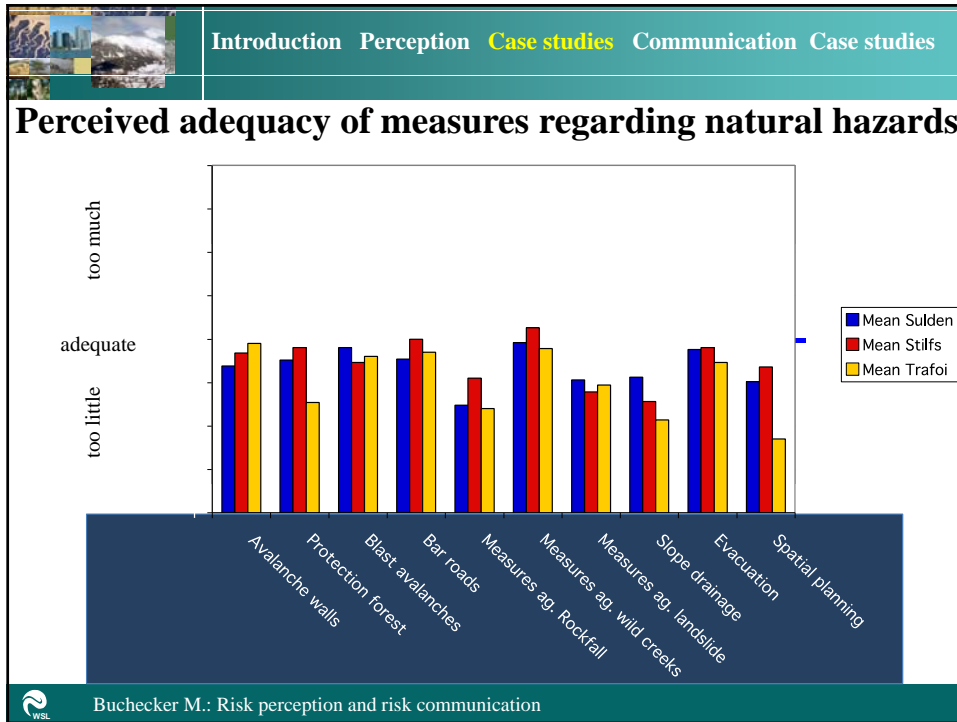
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Residents' trust in the assessment of natural hazards

Group	Trust Level (1-5)
Avalanche commission	3.6
Experts of administration	3.6
Local residents	3.5
Local guides	3.5
Local farmers	3.4
Myself	3.0
Others	3.0
Scientists	3.0
Ski teachers	2.5

Mayor?

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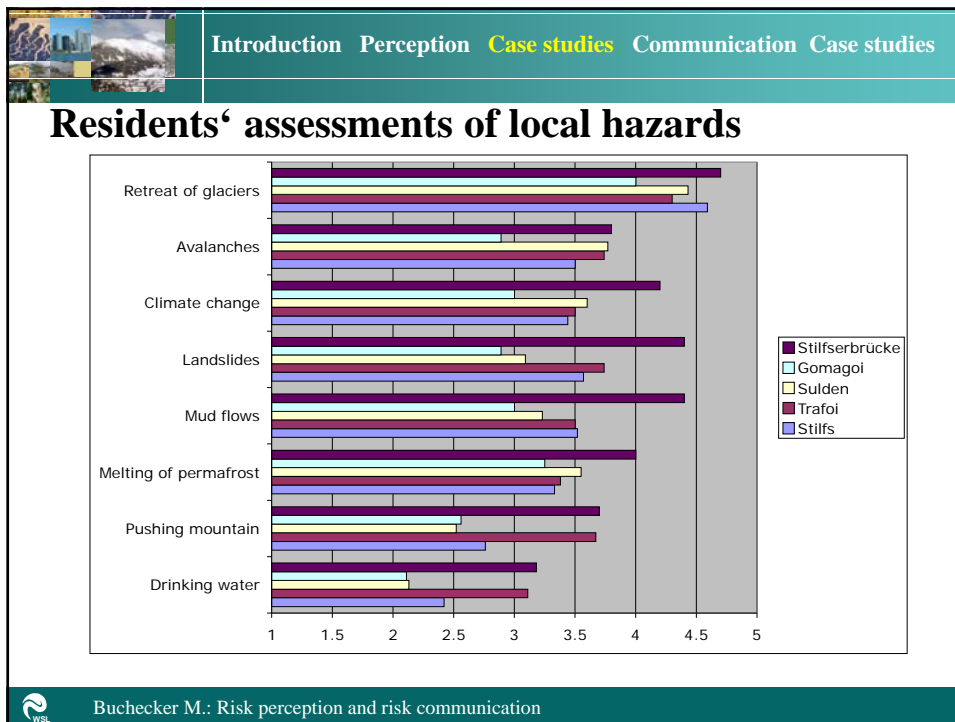
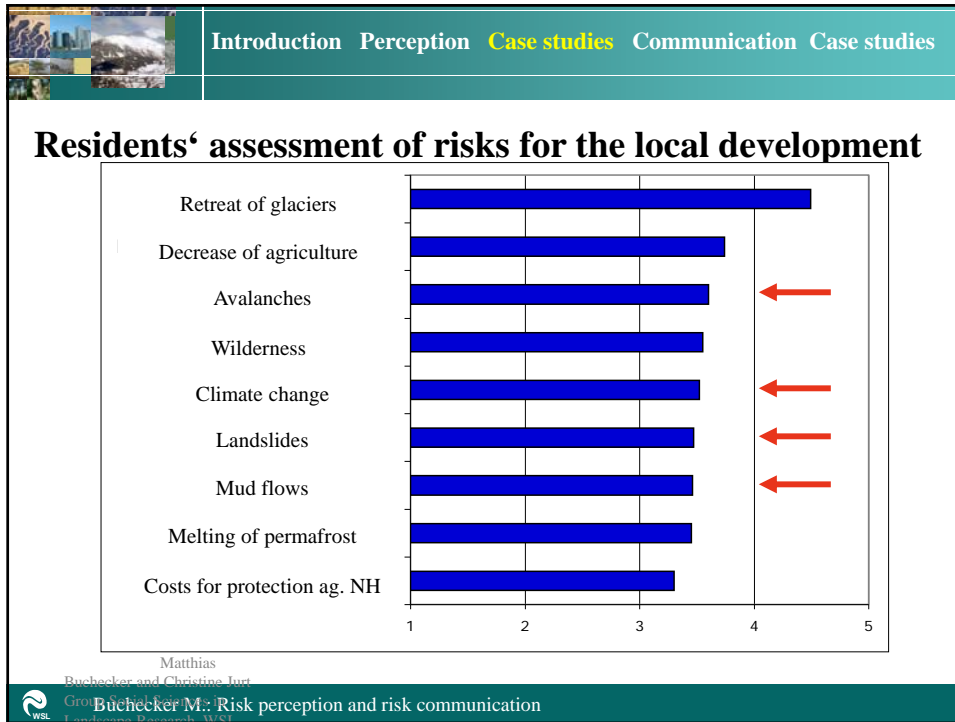


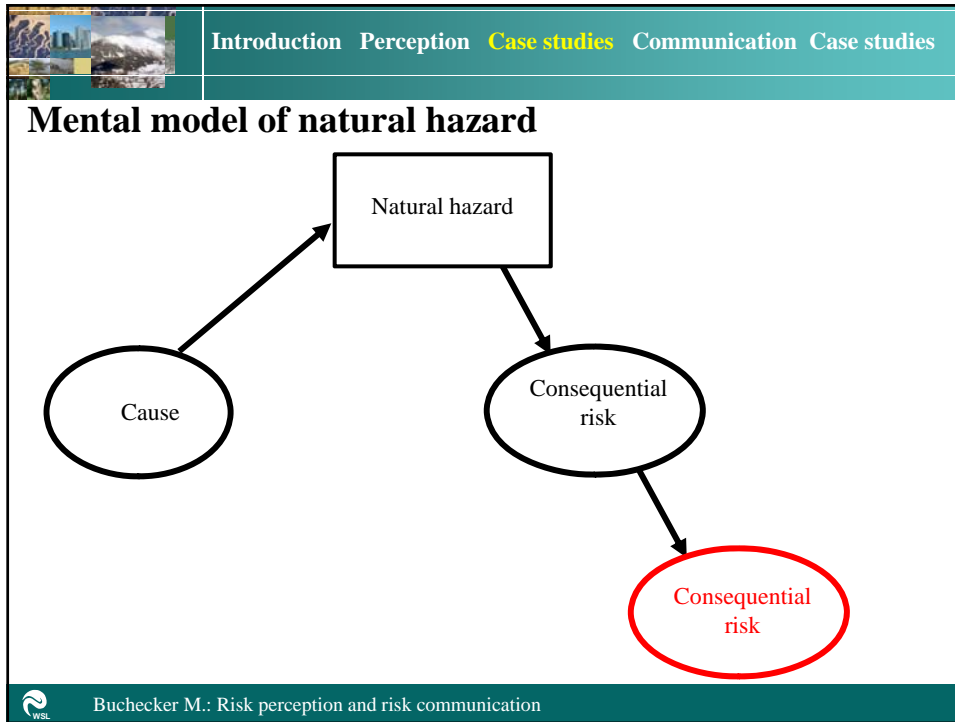
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Mentioned risks for the municipality of Stilfs

Natural Risks	Economic Risks	Social Risks
Mudflows	Regulations of nature conservation	Conflicts in the villages
Water quality	Decline of tourism	Change of values
Landslides	Economic imbalance between villages	Loss of local knowledge
Wilderness	Enlargement of EU	Loss of faith
Climate change	Decline of agriculture	Foreigners
Pushing mountain	Costs for protection against hazards	Loss of attachment to nature
Avalanches	Excess of tourism	Solitude
Permafrost	Too much forestry	Lack of education-opp.
Retreat of glaciers	Lack of jobs	

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Different perceptions regarding „increase of landslides“

Craftsman of Stilfs

Causes

- Retreat of Agriculture
 - Human made climate change

Consequences

- Commuting blocked
- **Emigration**

Claimed measures

- Immediate opening of street
 - Gradual repair
- Protection of valley access

Hotelier of Sulden

Causes

- Natural climate change

Consequences

- Tourists' access affected
- **Decrease of tourism**
 - Loss of taxes

Claimed measures

- Full repair before tourist season
- Protection of tourists' access

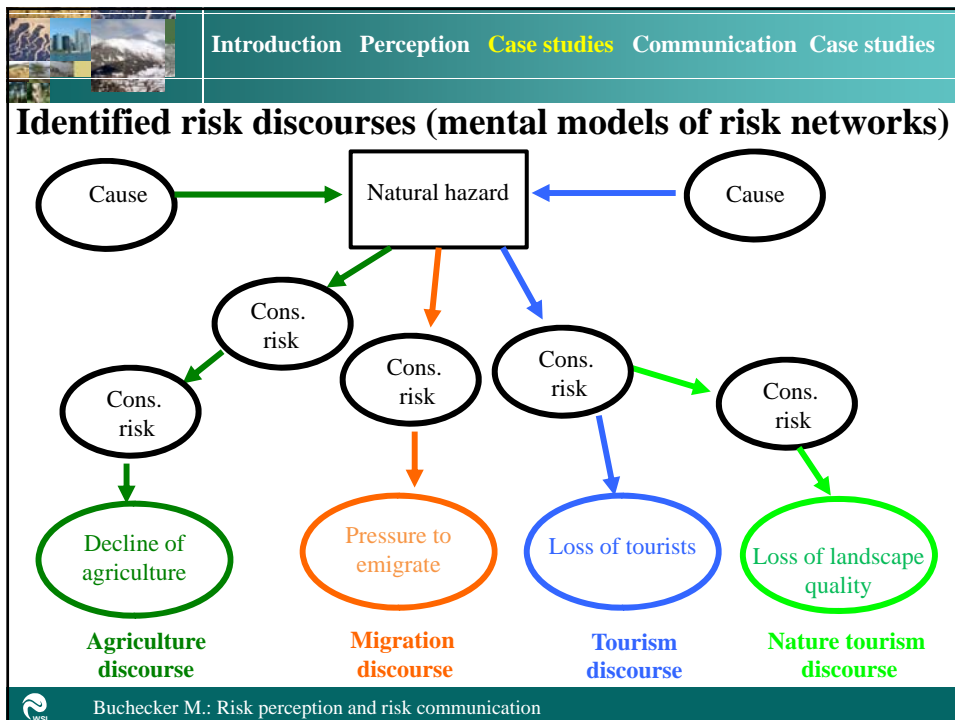
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Different perception regarding glacier retreat

	Farmer of Trafoi	Hotelier of Sulden
Causes	Human made climate change	Natural climate change
	Treatment of glaciers	Pollution of Milano
	Sand of Sahara	Sand of Sahara
Consequences		
- Short term	Less attractive landscapes	Less attractive landscapes
	Geological instability	Necessary investments
- Middle term	Lack of water for agriculture	Better competitiveness
	Decline of tourism	Global water problems
- Long term	Collaps of local agric./ economy	Recuperation (cycle)
Coping strategies	New ways of adaptation	Invest. in infrastructure
	Support of small scale producers	Less regulations

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Main factors of risk perception

Individual and collective experiences

Frame of perception

Mental model

Information flow

Perceived (livelihood) vulnerabilities

Meaningful knowledge

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