EURAC research

Thinking Global, Acting Local

Vulnerability to climate change and adaptation strategies in South Tyrol, Italy

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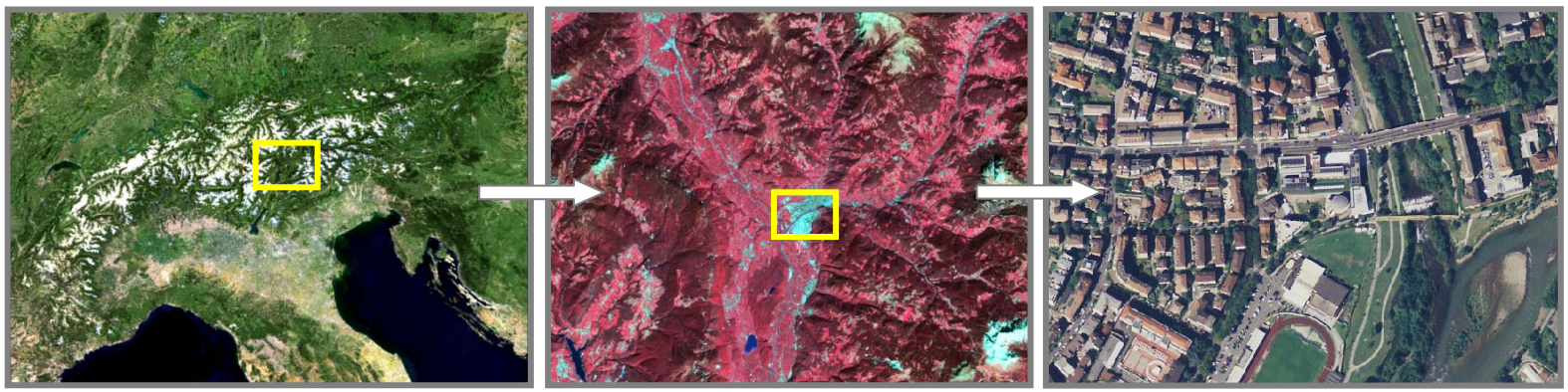
EURAC - Institute for Applied Remote Sensing

ToC

- Background
- Climate change in The Alps - past & future
- Climate change impacts
- Vulnerability to climate change
- Adaptation strategies

Who and where are we?

European Academy - Bolzano / South Tyrol / Northern Italy

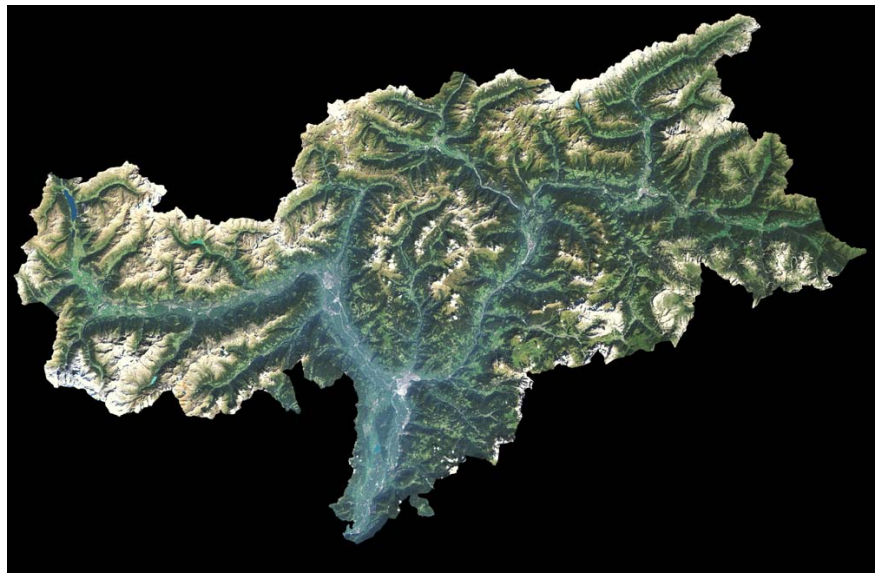


- independent non-profit research organisation
- 190 people in 5 research departments, 11 institutes
- interdisciplinary: from minority rights via public management and institute for the Iceman to sustainable development institutes
- including the institute for applied remote sensing

EURAC's Institute for Applied Remote Sensing

Objective:

to develop remote sensing applications for the Alps and other mountainous areas, addressing current environmental problems:



1 focus topic (amongst others):

vulnerabilility and risk to natural hazards and climate change impacts

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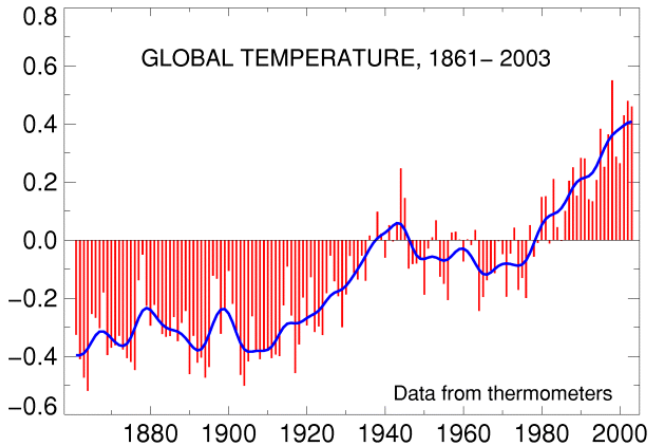
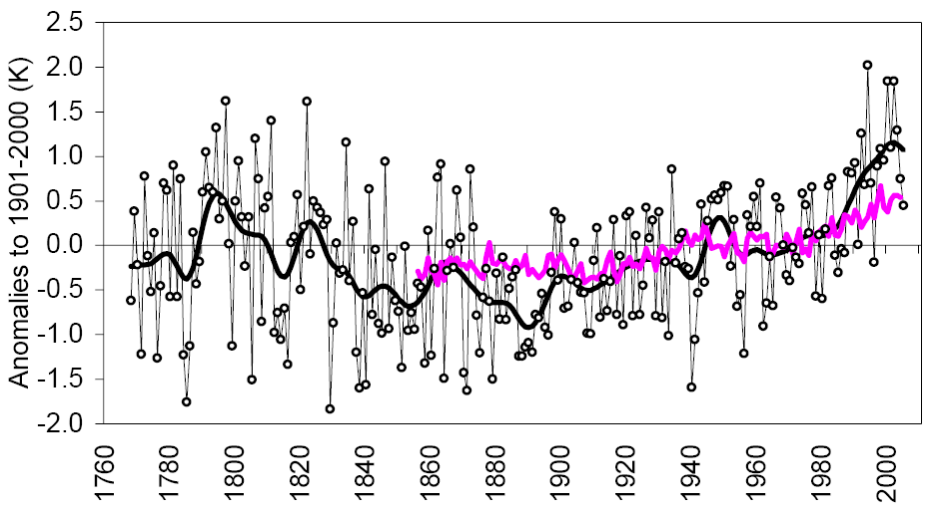
Experienced change in Temp – global / alps



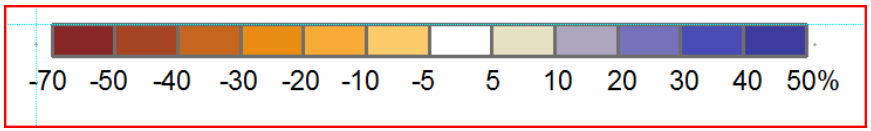
Global warming in atmospheric layer at ground level: average temperature increase since 1850: approx. 0.76°C (± 0.19°C) 0.65°C of which in the last 50 yrs.
(IPCC 2007)

Mountains:
early indicators of climate change worldwide, particularly the Alps, where recent warming was approx 3 times global average



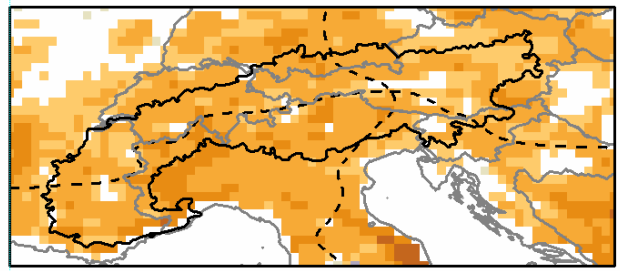
Compared to the global trend from 1890 to 2005 of +0.74K (global land at 0.5 deg grid - CRU TS), the GAR has warmed nearly twice as much.
(Final report for RTD-project ALP-IMP (EVK-CT-2002-00148)

Scenarios: possible changes in runoff / alps



2100 scenario in relation to average of last 100 yrs
(CLM data, ~20 km)

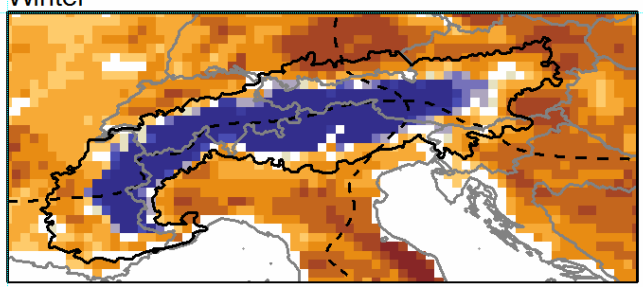
Year



E: -9, G: -9, A: -10, NW: -12, NE: -3, SW: -14, SE: -10, ST -8

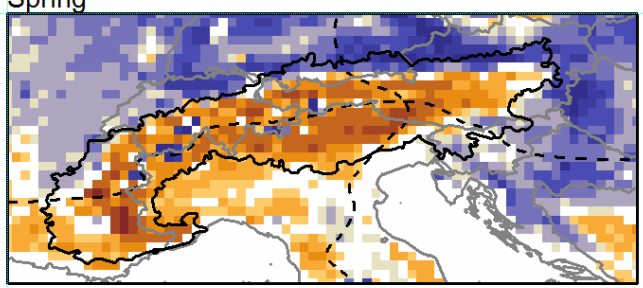
Runoff change until the end of the 21st century

Winter



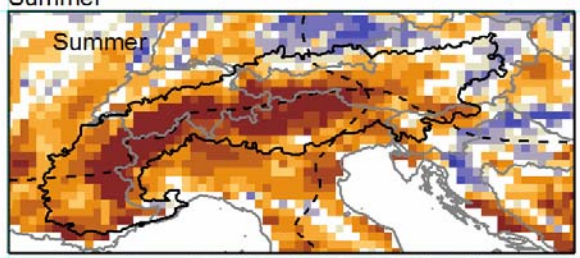
E: 16, G: 16, A: 64, NW: 115, NE: 14, SW: 63, SE: 10, ST 77

Spring



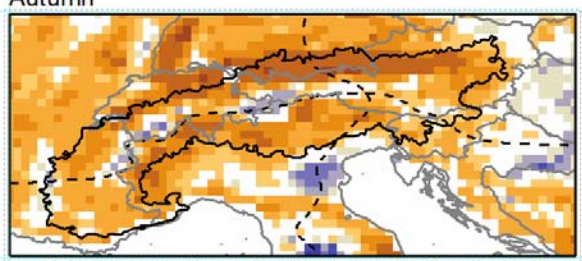
E: 12, G: 12, A: -2, NW: -9, NE: 15, SW: -13, SE: 5, ST -1

Summer



E: -38, G: -38, A: -40, NW: -47, NE: -24, SW: -28, SE: -35, ST -28

Autumn



E: -27, G: -27, A: -17, NW: -14, NE: -20, SW: -15, SE: -26, ST -15

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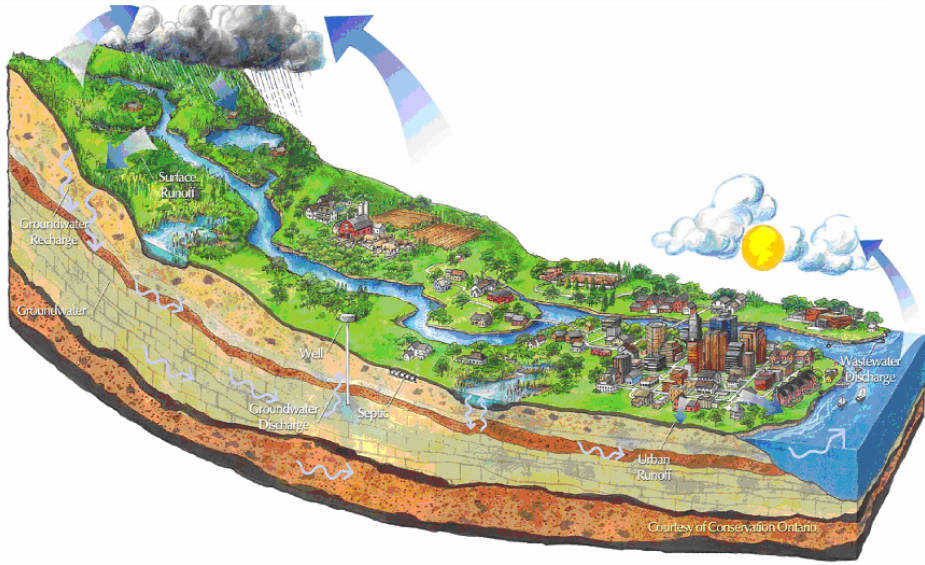
Impacts in mountain regions

Mountains (general):

- ❑ Changes in temp and moisture regimes, negative implications:
  disruptions of ecosystems and dependent socio-economic activities (e.g. agriculture)
  - Most crucial/evident ecosystem services:
    - Water tower (reduced glacier extents and snow cover) – large area service
    - Reduction of natural hazard impacts (Biodiversity loss, runoff extremes, etc)

- ❑ Increase of extreme events:
  ↑ frequency and severity of natural hazards (permafrost, precipitation patterns, extreme temp and rainfall etc…)



Brienz, 24. August 2005

Impacts in The Alps

The Alps, characterised by: High population density, high value economic activities, dense network of infrastructure

impacts:
- lack of snow cover for winter tourism
- water scarcity (at least in parts):
strong competition between
    - tourism (artificial snow),
    - irrigation for agriculture
    - drinking water
    - hydropower
    -nature protection
- Loss of attratction
  (biodiversity, glaciers etc..)

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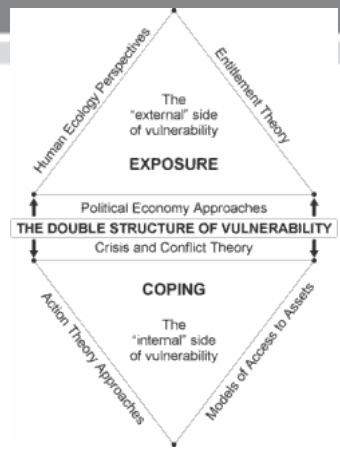
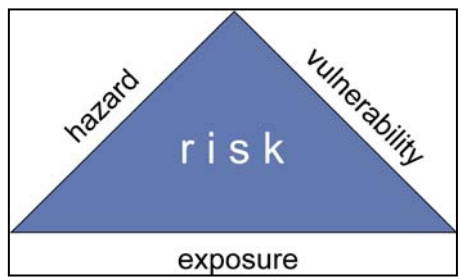
Vulnerability concepts

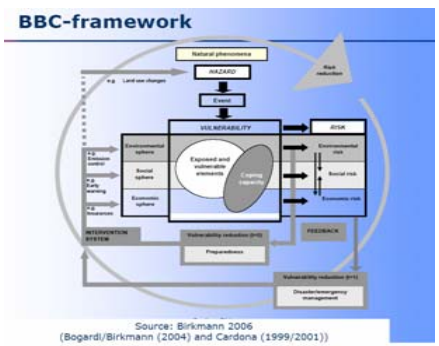
Various schools / research communities

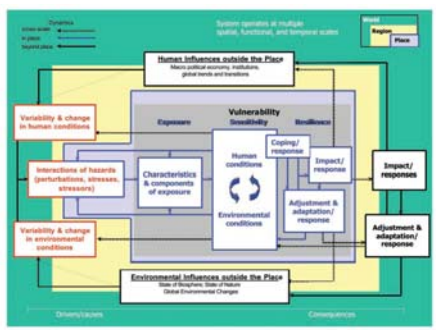
- ➔ various objectives / scales (time and space)
- ➔ various concepts
- ➔ various ways of understanding, defining and assessing vulnerabilities



- Food security / livelihood / development community (e.g. Bohle 2001)
- Risk / disaster assessments (Crichton 1999)
- Climate change (e.g. Turner et al 2003)
- Integrative approaches (e.g. BBC 1999/2001/2004)
- Economic, policy analysis, security etc….







Climate Change concept

Exposure

Sensitivity

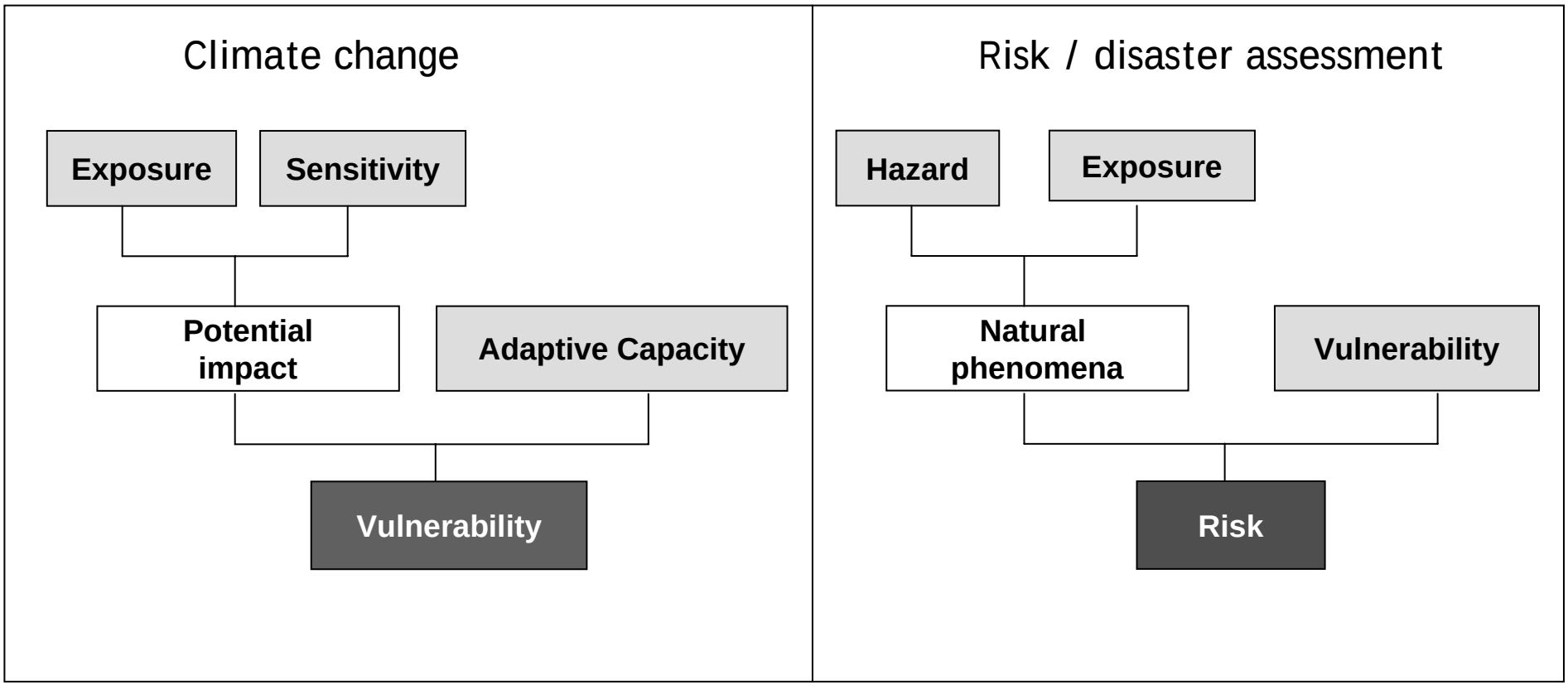
Impact

Adaptive Capacity

Vulnerability

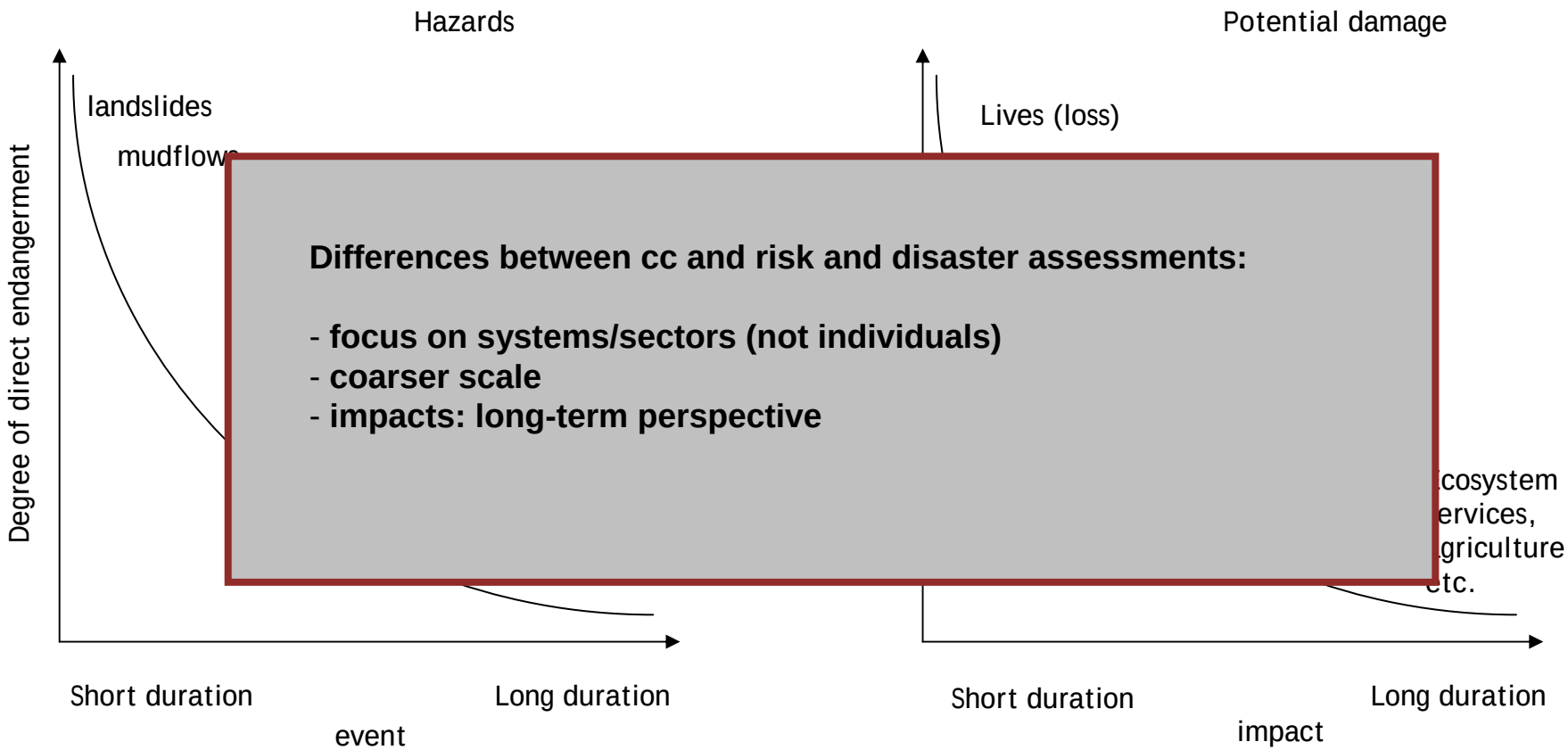
Bangladesch

Comparison of two vulnerability concepts for cc



Common understanding is needed for integrated approaches!!

Differences – cc – drr community



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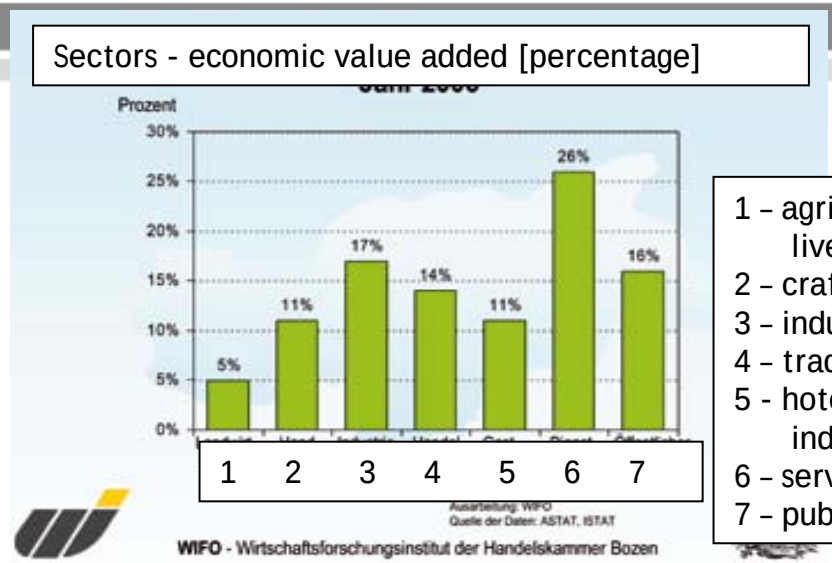
Adaptation strategies – South Tyrol

South Tyrol - some basics:

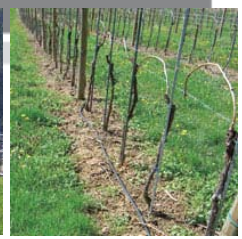
- Autonomous province in Northern Italy
- Population: 400k
- 7400 sqkm – 14 % below 1000m
- GDP: ~ 13 billion €
- Almost full employment
- Diversified economy
- Small and very small companies



1 – agriculture (fruit, livestock, vine)
2 – craft
3 – industry
4 – trade
5 - hotel & restaurant industry
6 – services
7 – public sector

Pressure on valley bottoms and arable land, industrialised agriculture, trafic…

Adaptation strategies – South Tyrol



We do not start at zero:
in South Tyrol (as in many other regions) strategies to deal with weather extremes have been used in agriculture for centuries and in modern economic sectors for decades.

Examples:
- Waale for irrigation in drier areas
- dealing with all kinds of natural hazards (particularly: flash floods, landslides and mudflows, avalanches)
- high altitude water basins as drinking water reservoir, for hydropower or in more recent years as source for snow canons.

Most recently:
- artificial snown
- 'Klimahaus'

Adaptation strategies – South Tyrol

Adaptation strategies should (and often are in South Tyrol):

- be based on best data available with respect to current situation and future scenarios – including as accuracy assessment particularly for the latter one
- be developed in close cooperation between scientists, planners, decision makers and all relevant stakeholders (starting with the vulnerability assessments)

But…

- Climate change increases the risk level you have to be prepared for
  as we can already see with storms (wind speeds) and floods (HQ values)
  - ➔ new legislations

- Most strategies follow a sector approach, that is, they are focusing on one activity or sector (agriculture, environment, craft, culture, tourism), and on one dimension (economy, landscapes, natural parks) – example water

The sustainable solution is an integrated approach:
Cross-sectorial and partnership

Where to set priorities?

- **Protecting the climate**
  - saving energy
  - using renewable energies
  - implement soil protecting handling (in agriculture)

- **Adaptation**
  - integrative approaches
  - communication and risk awareness
  - prevention
  - monitoring
  - new technologies
  - cooperation (transnational, sectoral, ...)

What we should not do….