

**Information Exchange Event JRC-Norway**

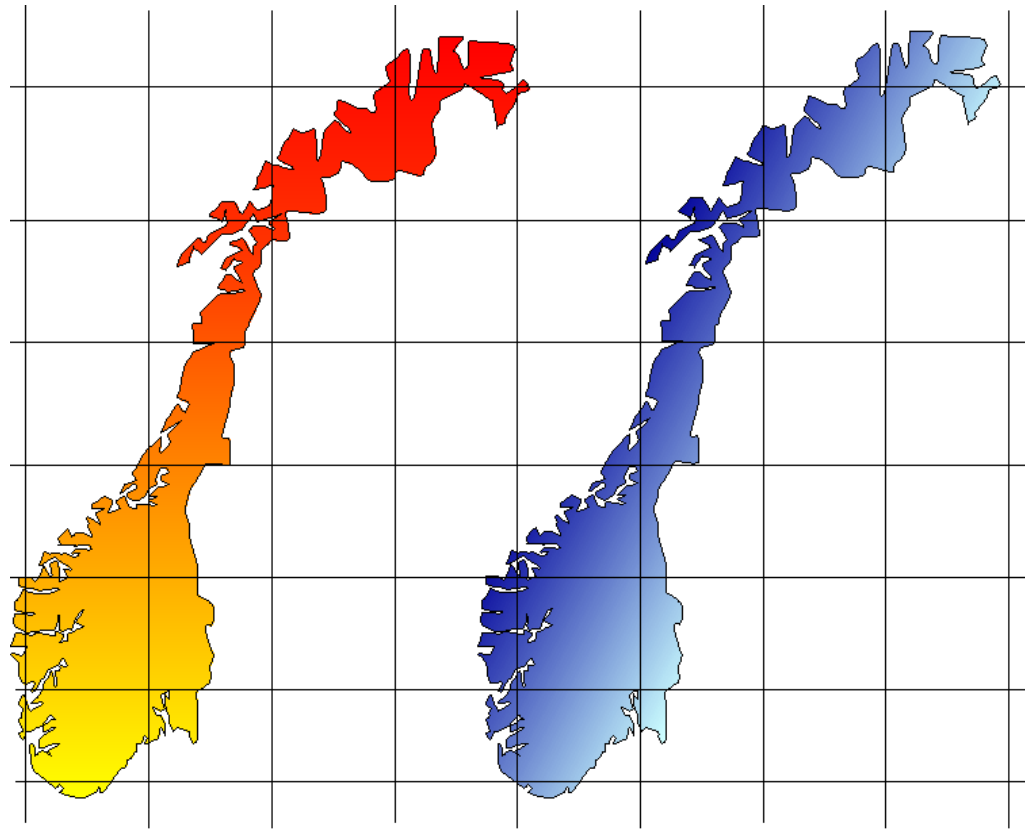
# **Research on Impacts of Climate Change in Norway**

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*CICERO*

CIENS, June 18, 2010

# Sketch of climate scenarios for Norway



Change in mean  
temperature

Change in annual  
precipitation

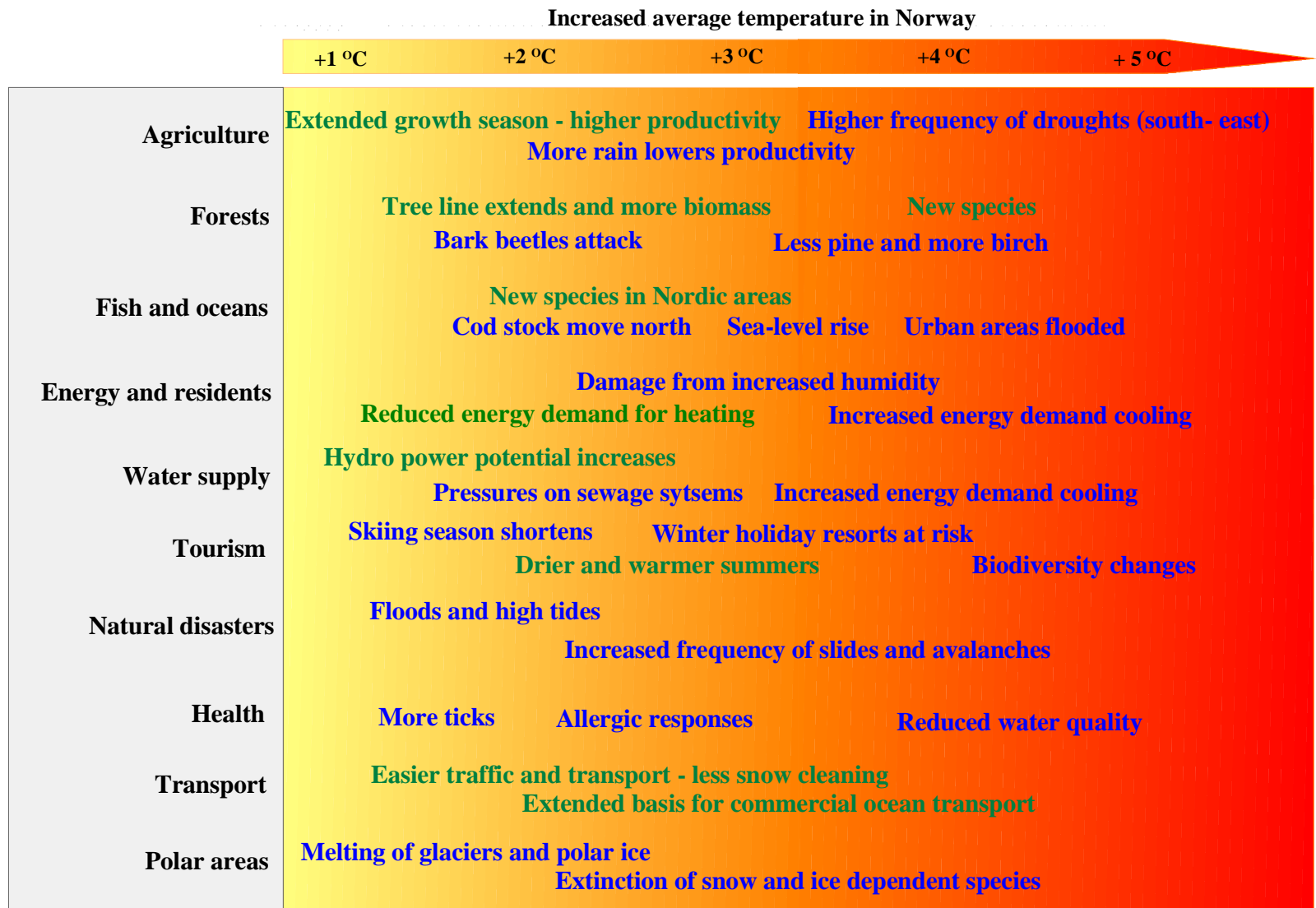
*Seasonal variations:*

- Highest  $dT$  in winter
- Highest  $dP$  in autumn

*Extremes:*

- Higher frequency of heavy rain periods

# Anticipated impacts of climate change in Norway



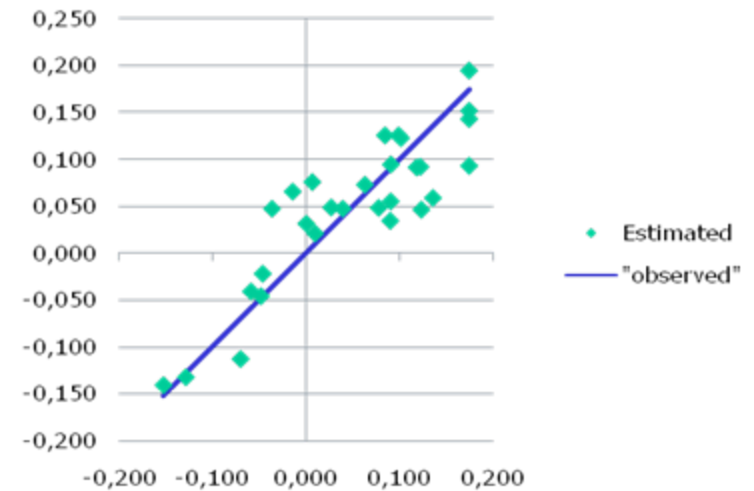
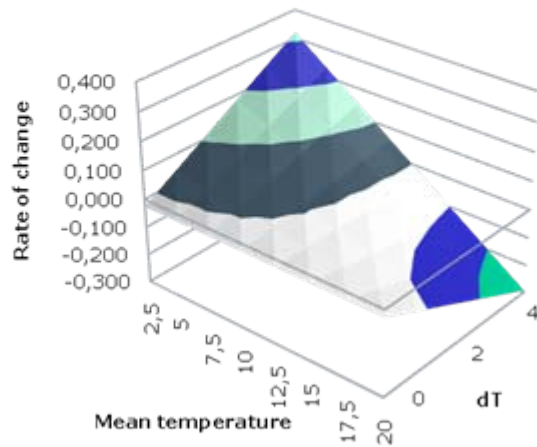
Source: Report to NOU Klimatilpassing

# Quantifications of total impacts in Norway

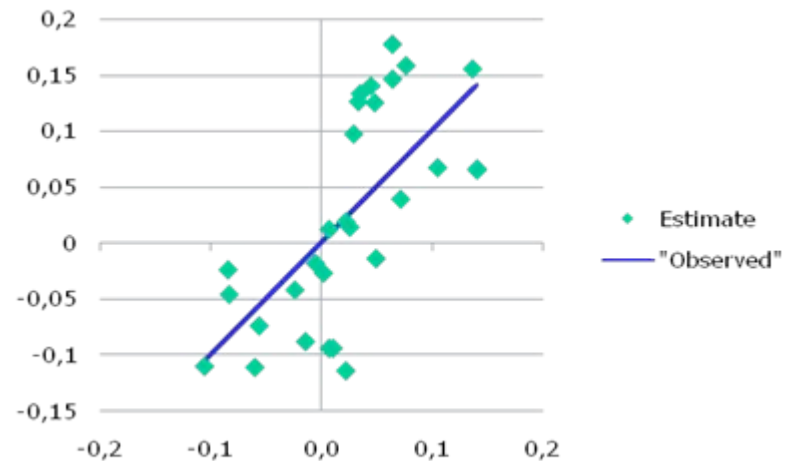
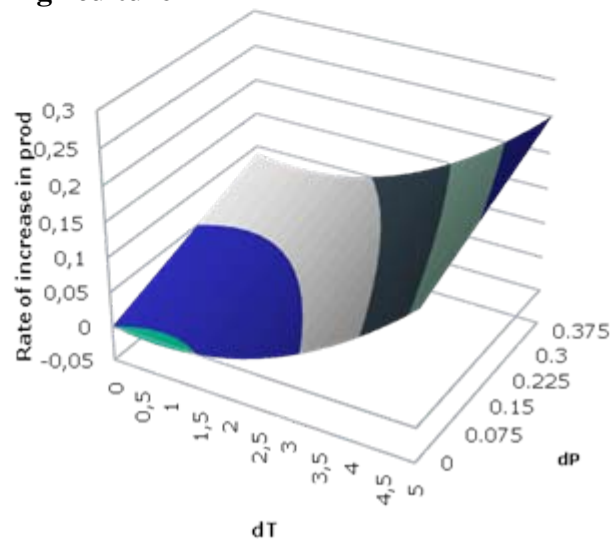
Sector	Evaluation	Quantified
Agriculture	Well covered - outdated totals	Yes
Forestry	Fairly good. Norway part of several Europe/Nordic studies, but no separate studies	No
Fisheries	Many studies, but vast uncertainties. Unified perception of direction, but no specifications	No
Sea-level rise	Estimates of level available, costs unknown	No
Energy and buildings	Energy demand, hydro-power supply and impact of humidity is covered, but long-term effects and adaptation in power production is not addressed	Yes
Water supply	Impacts known, but local focus. No assessments of total impacts	No
Tourism	Relationship between climate and tourism basically unknown, but potentially significant. Uncertain.	No
Natural hazards	Cost estimates of events available, but thorough assessment of the total expected cost unavailable	No
Health	Possible impacts indicated, no assessments of totals	No
Transport	A range of potential impacts indicated, but few assessments. Estimated impacts of slides indicate small totals.	No

# Impacts functions - examples

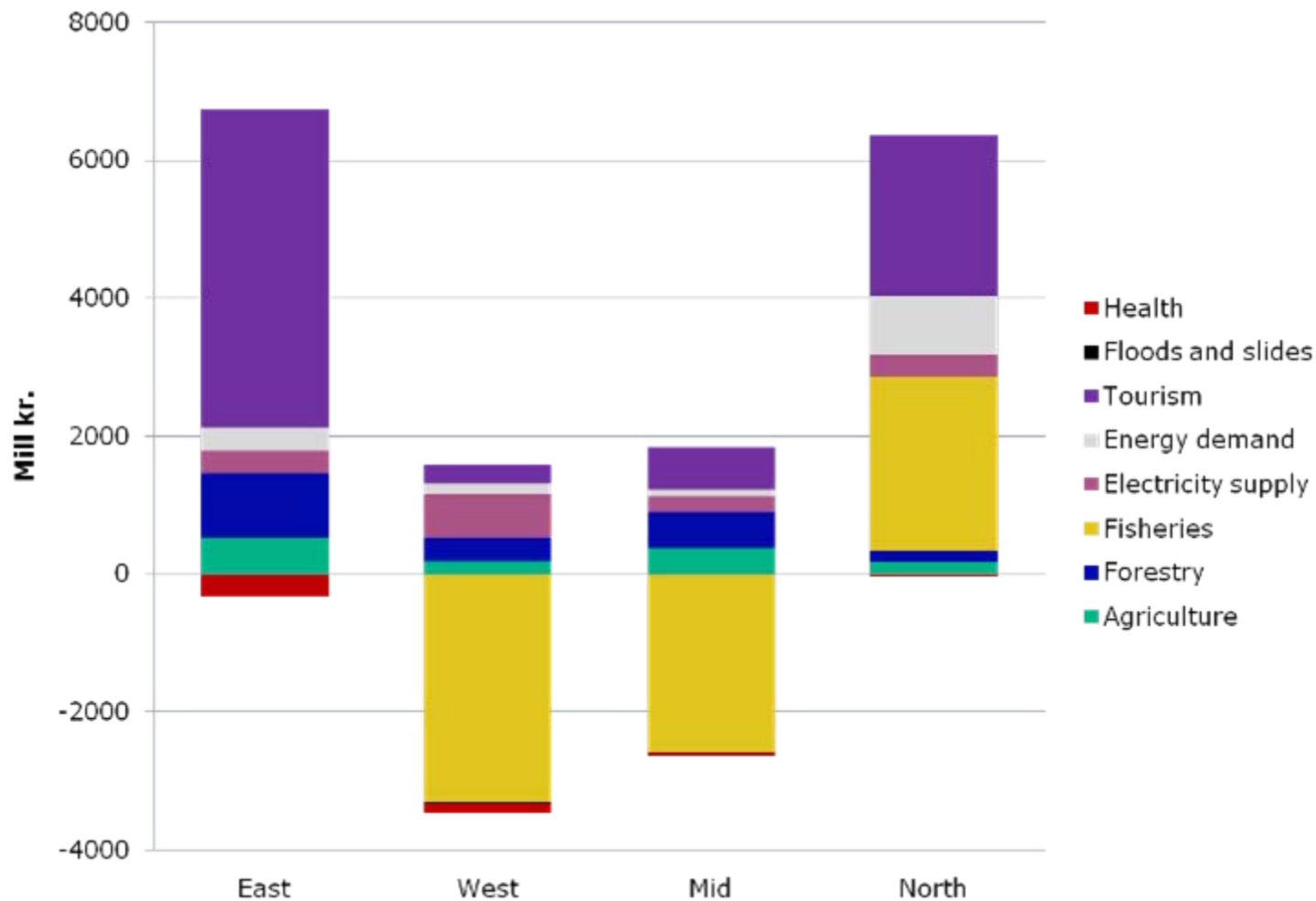
## Tourism



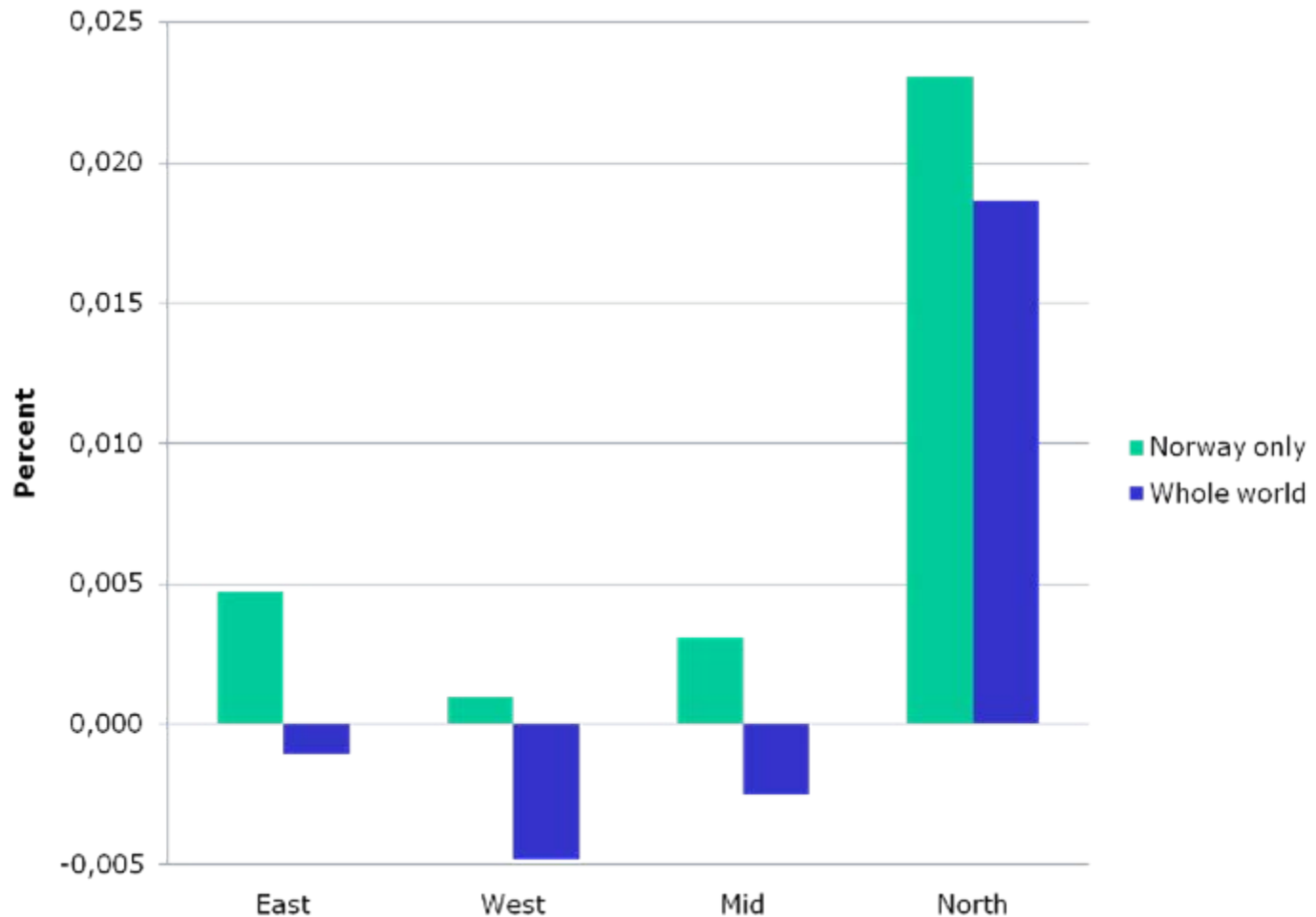
## Agriculture



# Estimate of direct economic impacts in at +3°C



# Economic impacts to Norway at +3°C with autonomous adaptation



# The uncertainties of impacts estimates:

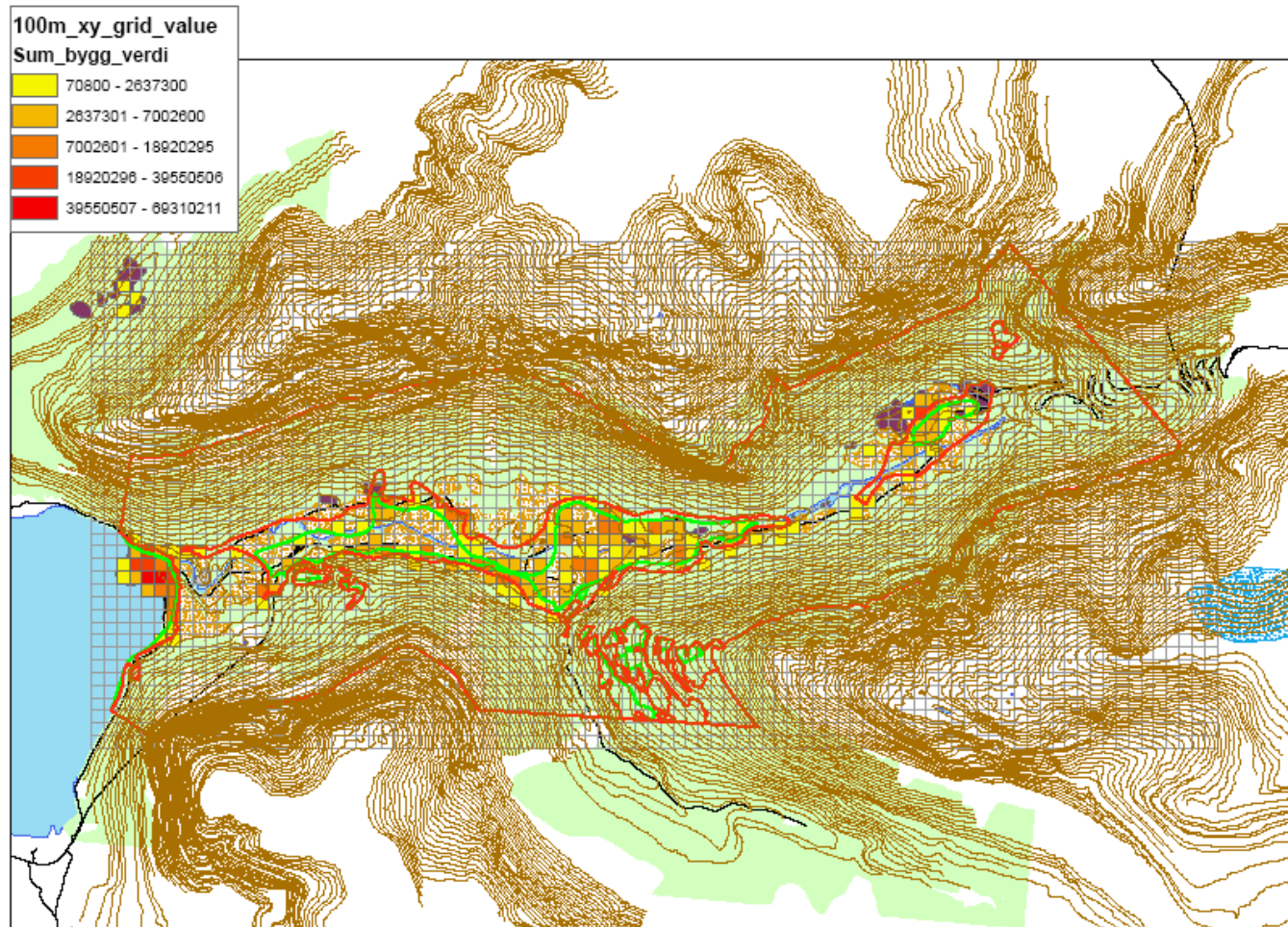
The costs of slides estimated with reference to assessments of slide frequencies

*Take for given:*

- Future climate
- Climate change impact on extreme weather events
- Relationship between weather events and slides
- The force of a slide
- No human losses or injuries



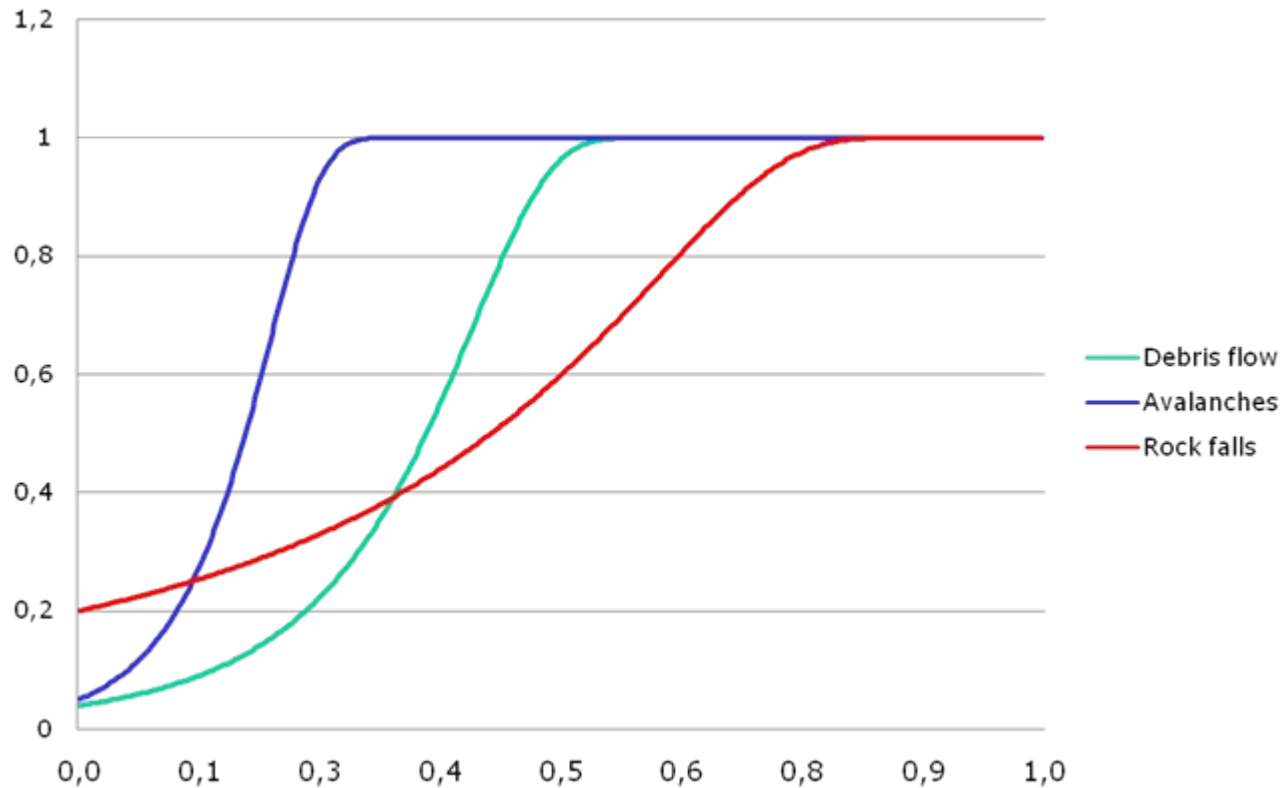
# Mapping of values: Hjelledalen



The uncertainty about the actual value is substantial

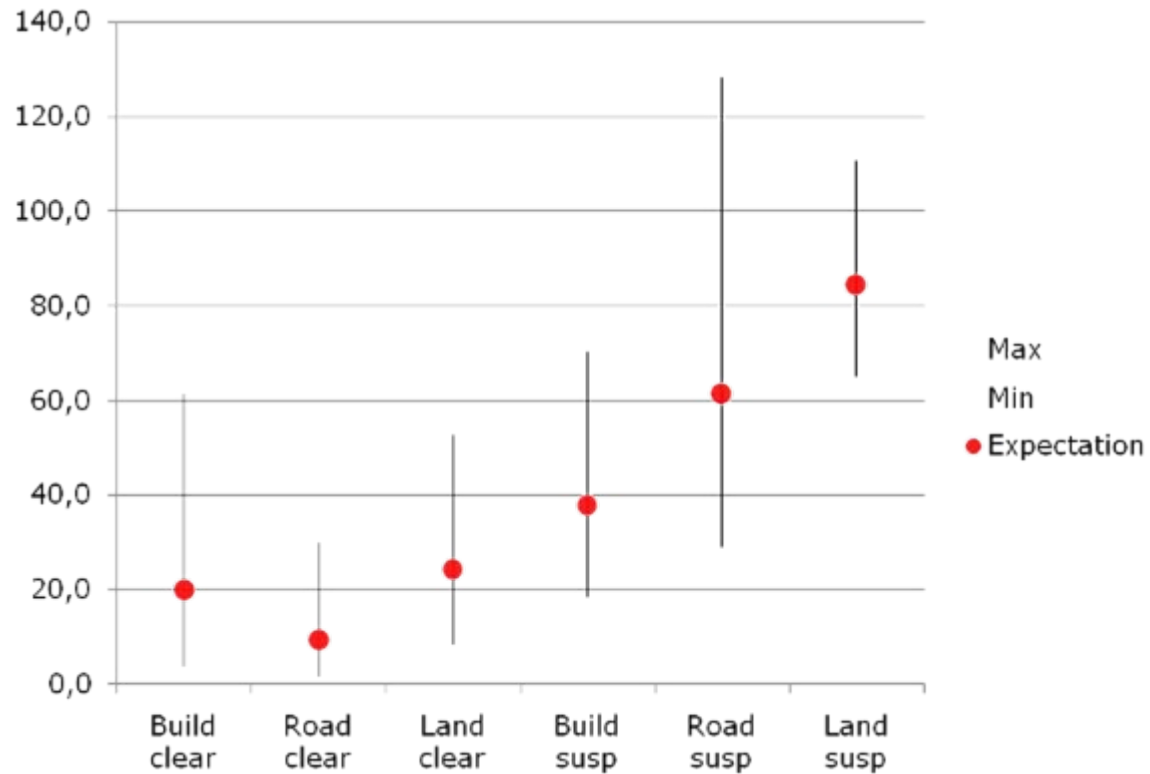
# Risk of material loss in case of a slide

*How much is destroyed?*



...we can make assumptions, but do not know much

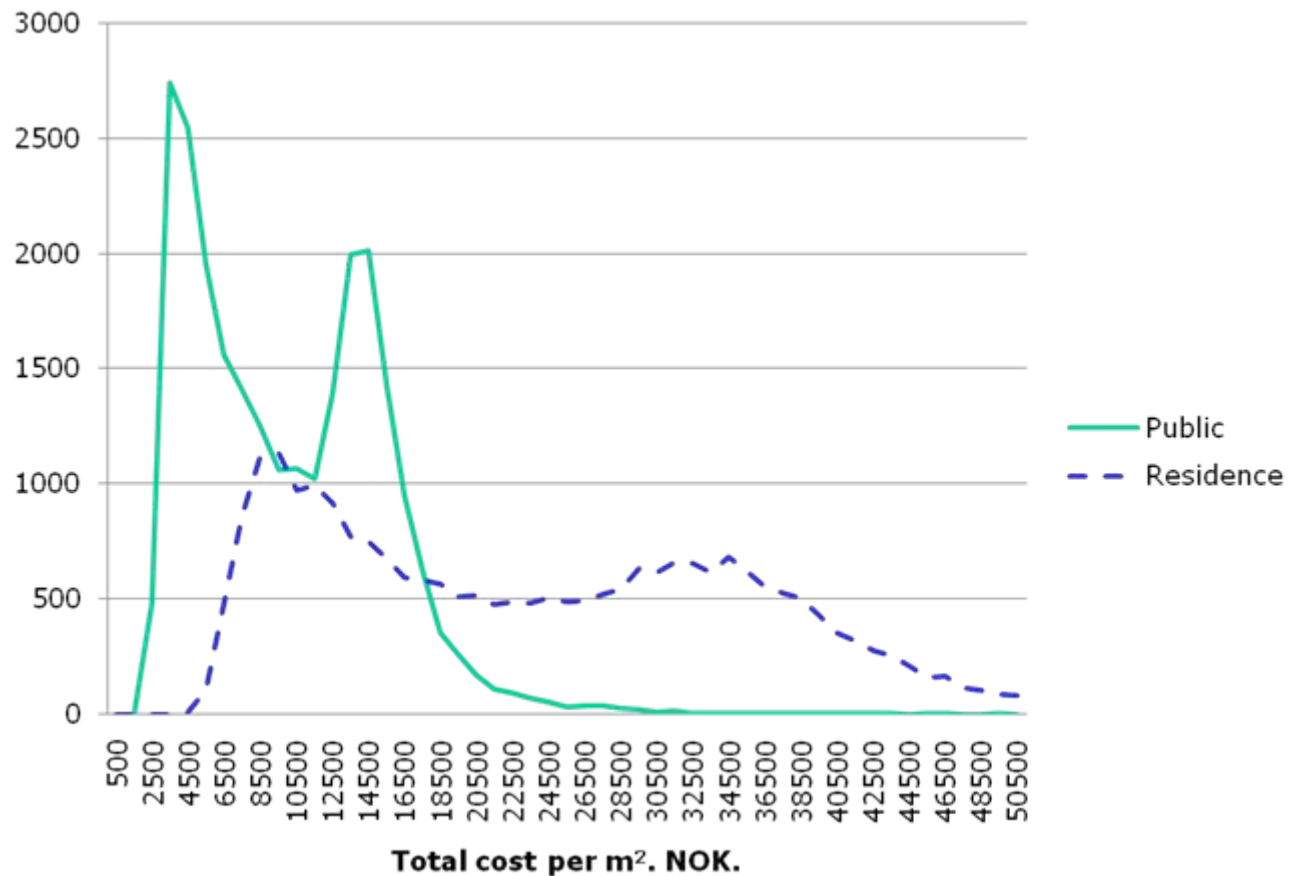
# Added economic risks in case of a slide



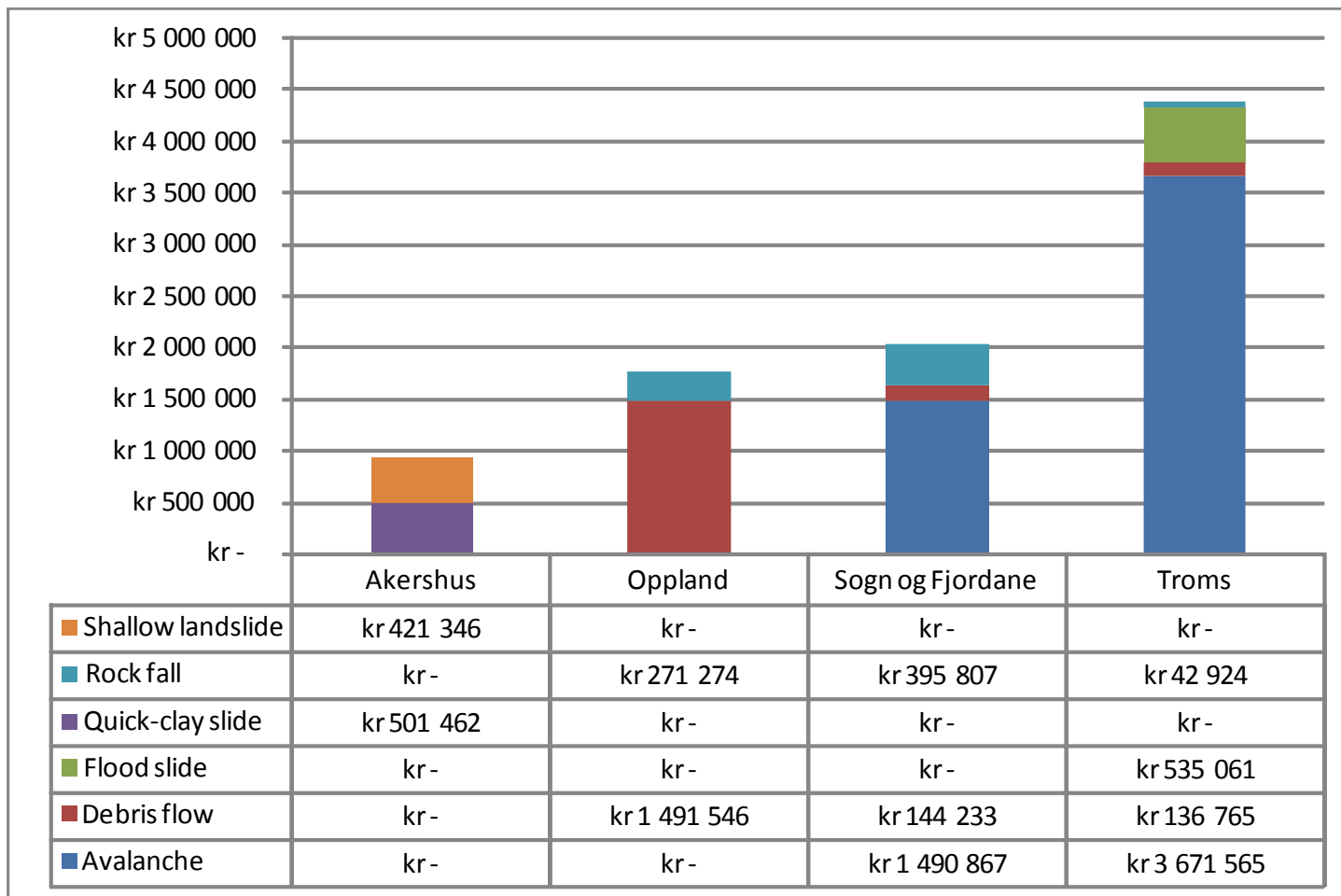
...based on guesstimates

# Probability density functions for economic costs of slides in Hjelledalen

(Material loss only)



# Expected annual loss by slide type and case area



# Adaptation to climate change

...is to make appropriate decisions under uncertainty – and acknowledge the risks

**Thanks!**