

Final Conference

# Climate Impacts and Flood Risk Management Project Nor5 at NVE

### Main Idea

To develop and apply an integrated framework for assessing and delivering climate impact model results, including the uncertainties underlying those projections. Target end users are municipalities and others engaged in flood



Norwegian Water Resources and Energy Directorate



hazard mapping and in flood management

## Approach

- » To develop estimates for likely changes in 200-year flows for Norway
- » To estimate the uncertainty in the projections
- » To develop regional guidance for use of projections by water managers
- » To investigate methods for communicating the impacts of climate change on flooding.

**Methods:** The development of projections for likely changes in flooding due to climate change uses a series of linked models and analyses.

### Outcomes

Projected changes in the 200-year flood have been developed for the whole of Norway as part of NVE's SAWA project work. It is anticipated that some portions of Norway will be subject to large increases in flood hazard, whilst others will experiences a reduced flood hazard in the future. This difference is due to the relative importance of extreme rainfall vs. snowmelt in generating floods. Under a future climate, warmer winter temperatures will lead to a reduced snow volume and an earlier snowmelt, whereas extreme precipitation will increase throughout the country.

#### Hydrological/Hydraulic modelling (e.g. HBV, MIKE)

#### Flood frequency analysis (e.g. GEV)

Figure 1. Chain of linked models used for analyzing climate change impacts on flood frequency.



Regional guidance has been developed to assist flood managers in interpreting the projections for changes in flooding (Lawrence and Hisdal, 2011) see an example: fig. 3.

Discussions are now taking place in Norway as to the best method for communicating these results to local municipalities in their work with flood management. Possibilities include:

- » Illustrating likely changes in flood due to climate change on the standard flood hazard map prepared by NVE
- » Preparing a separate flood hazard map which illustrates inundation under a future climate
- Reporting the likely effects of climate change on inundation in the report which accompanies the flood hazard map (but not actually illustrating it spatially)
- » Reporting the likely impact of climate change on flood hazard in a letter to the municipality (i.e. in a separate communication from the flood ha-





Figure 3. Example of regional guidance for expected changes in flooding – Region 6 (Østlandet)



zard map for the area).

The final decision as to which method(s) is used will taking after discussions with those engaged in flood hazard mapping and in flood management.

**Referens:** Lawrence, D. and Hisdal, H. 2011. Hydrological projections for flood in Norway under a future climate. NVE Report 5-2011.

Figure 4. Inundation depths for the 200-year flood for an area in southwestern Norway, taking account of a 40% increase in peak discharge and a 1.26 m increase in sea level



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